VOLUME XLV NUMBER SIX

# THE NATIONAL GEOGRAPHIC MAGAZINE

JUNE, 1924

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**SIXTEEN PAGES OF ILLUSTRATIONS IN FULL COLOR**

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In the Land of the Vikings
16 Full-Page Illustrations DONALD McLEISH

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TO carry out the purposes for which it was founded thirty-six years ago, the National Geographic Society publishes this Magazine. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resultant given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purchase was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings and whose customs, ceremonies, and name have been engulfed in an oblivion.

THE Society also is maintaining expeditions in the unknown area adjacent to the San Juan River in southeastern Utah, and in Yunnan, Kweichow, and Kansu, China—all regions virgin to scientific study.

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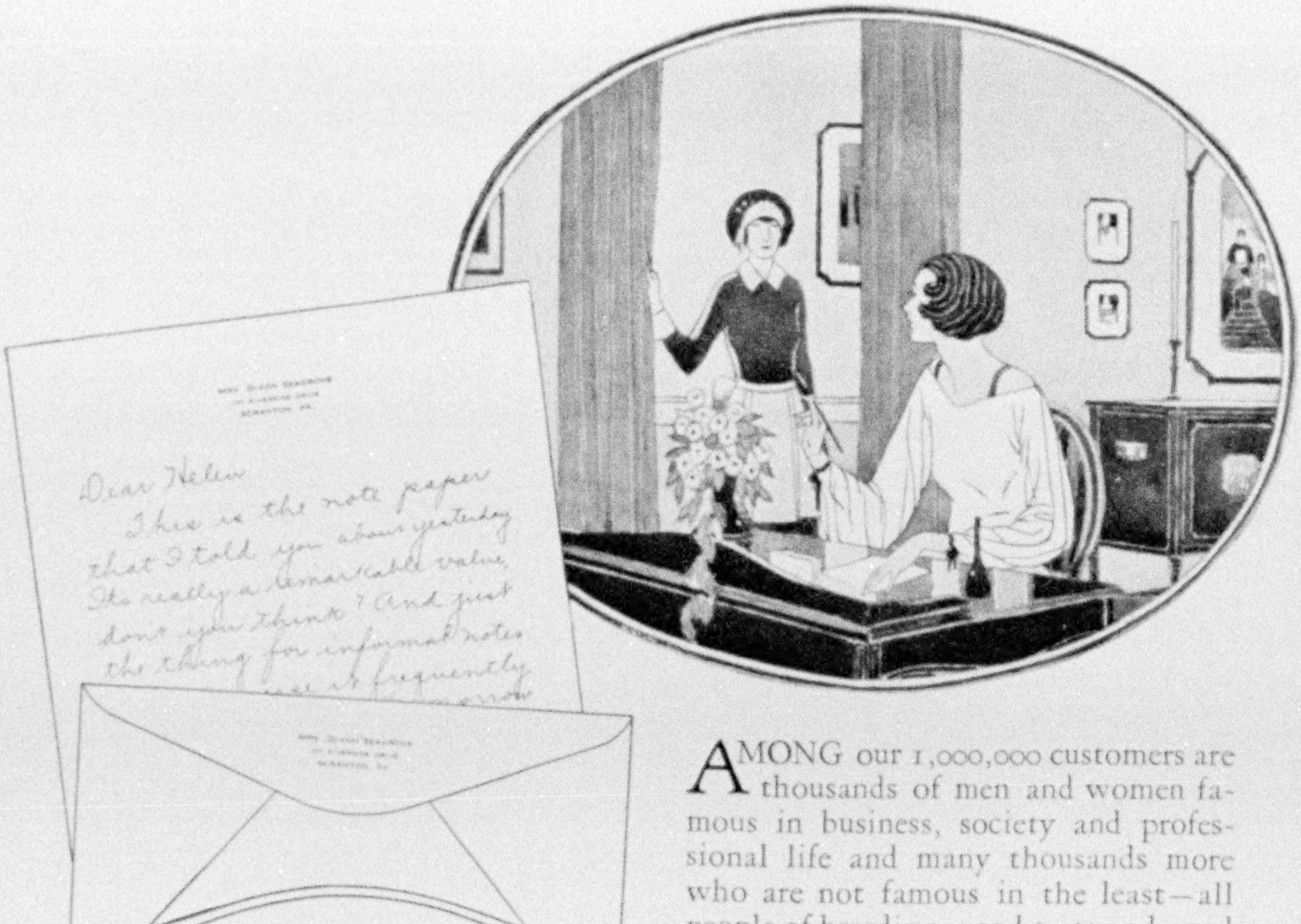

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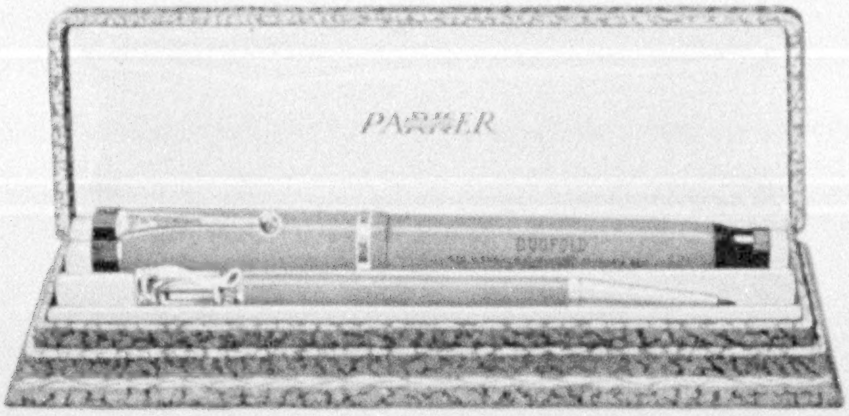

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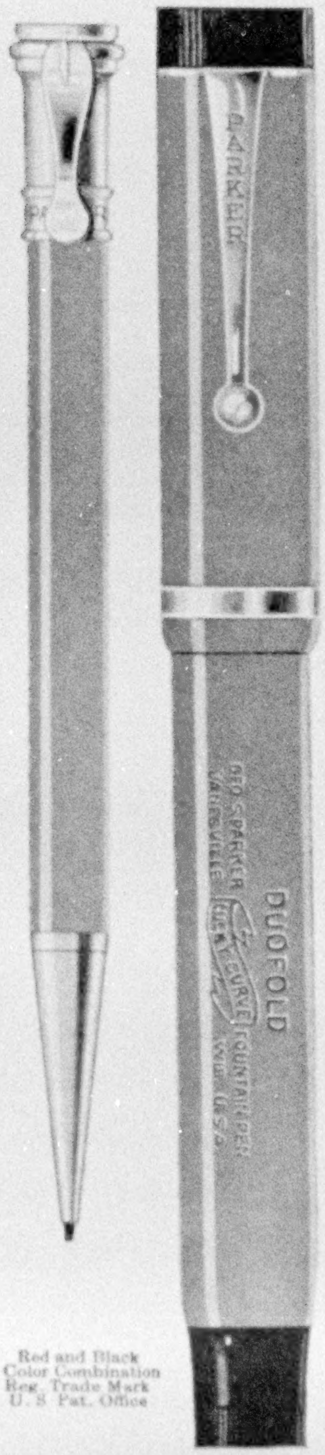

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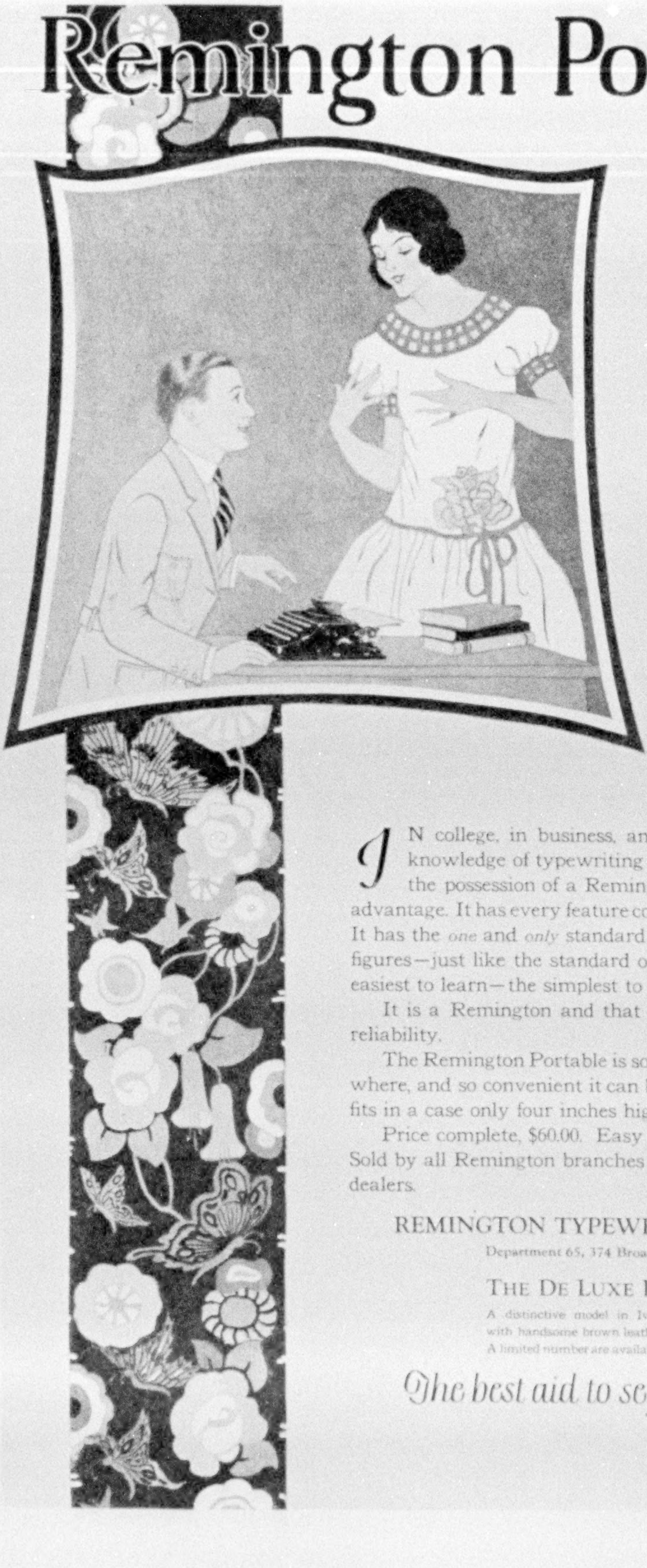

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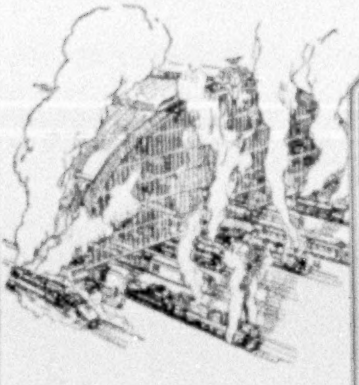

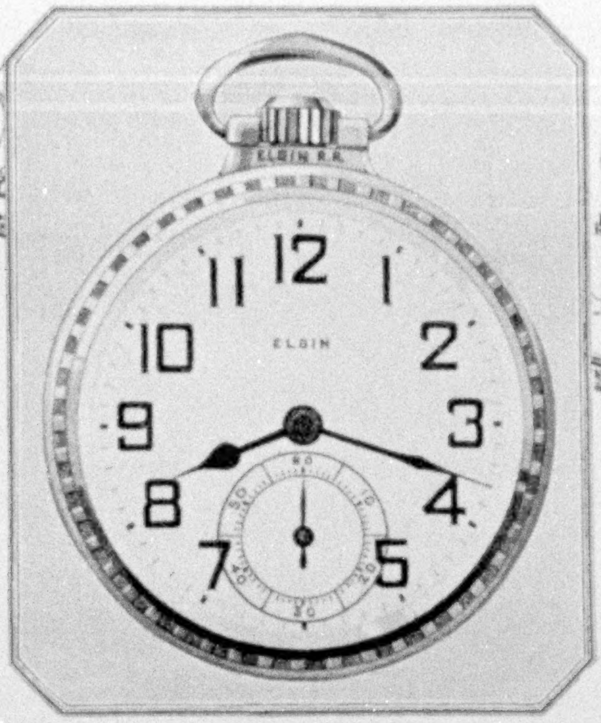

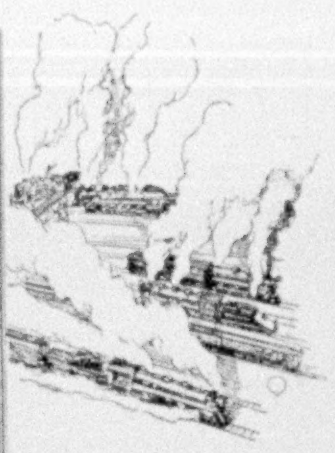

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ALTHOUGH only about six months have passed since Elgin offered the Railroad Watch, "The New B.W. Raymond," it has gained an acceptance unusual in such a short time.

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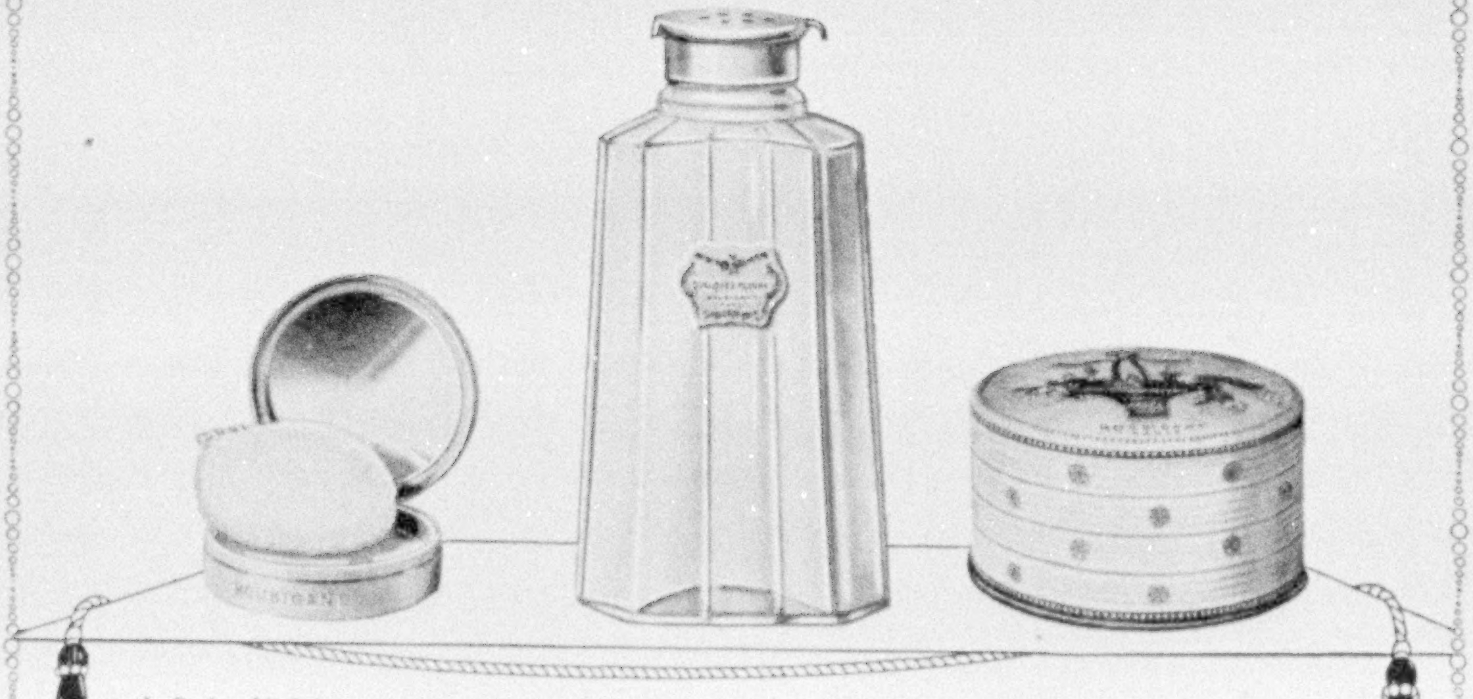

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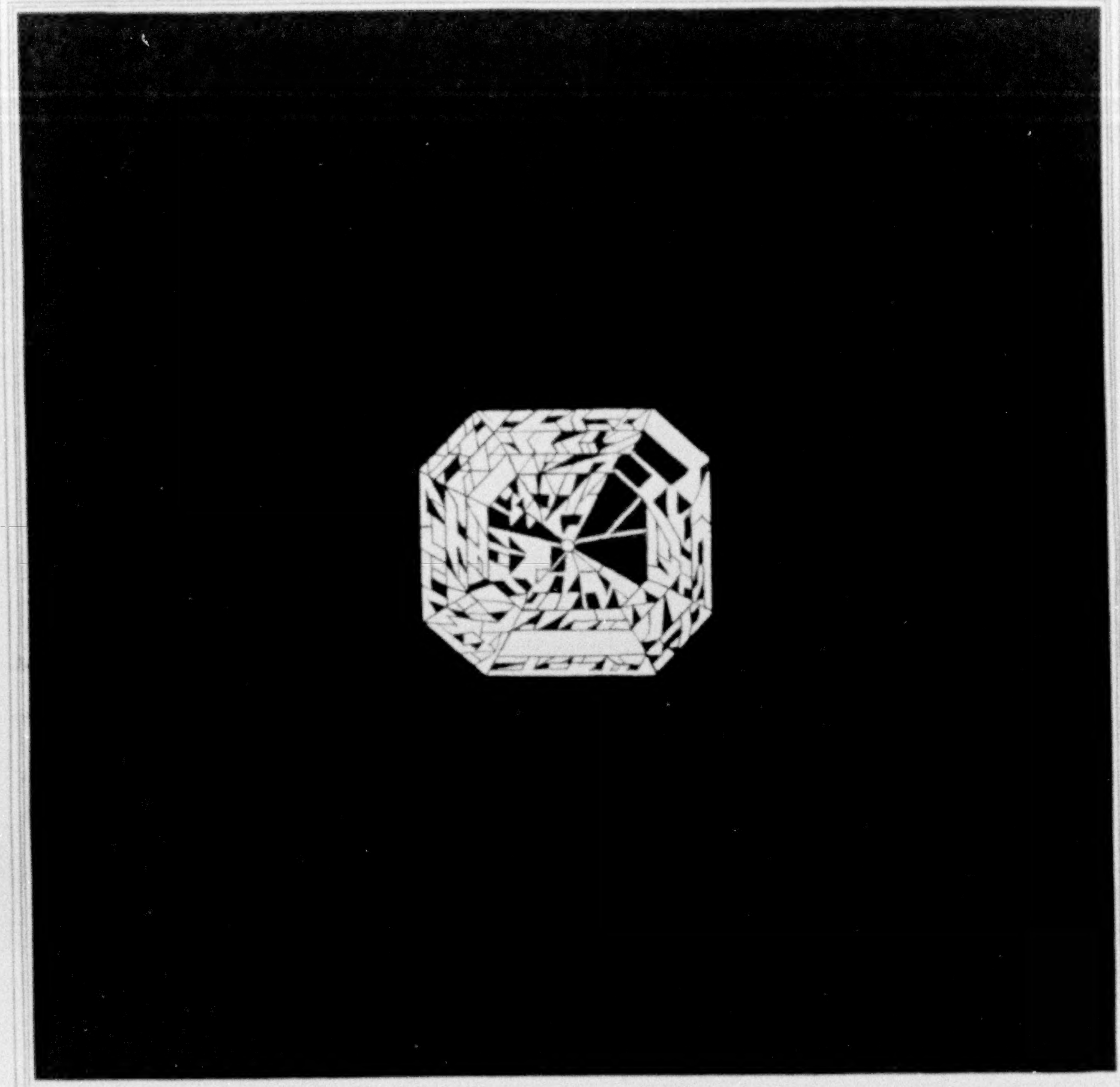

THE LARGEST BLUE DIAMOND IN THE WORLD

*Most of the world's historic diamonds are now part of the crown jewels of what is left of European monarchies. The Orloff is Russia's. The Koh-i-noor belongs to England, as also the Cullinan, which was presented to the late King Edward by the Transvaal. The Florentine is owned by Austria. Behind each of these famous stones is a long trail of romance and adventure. Another historic jewel is the Black Starr and Frost diamond—a blue diamond, of particular intensity of color, weighing 127 carats, and larger than the Koh-i-noor. More than that it is the largest blue diamond ever discovered, is absolutely perfect in every way, and is the largest diamond of any kind offered for sale. Size* $1\frac{3}{32}$" *by* $1\frac{5}{32}$"*, price $300,000. There have been other famous jewels, of course, in the history of Black Starr and Frost. Five generations of customers have relied on this house for their rarest gems. We look forward with pleasure to providing the same service for many more generations in the years to come.*

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# What You Can Do With The Traffic Transmission

## Change speeds without clashing

Because it eliminates all clashing of gears, the Traffic Transmission (Campbell patent) is acknowledged to be the most important automotive improvement of the decade. By enabling any driver to make a split-second, positive, silent change to any speed at any time, it adds new pleasure to driving and makes parking a matter of seconds instead of minutes. There is nothing new to learn.

## Descend steep grades in safety

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Skidding is caused by unequalized braking—which is liable to develop in even the finest braking systems. This cannot occur in a Chandler. When a quick stop is imperative, you simply snap into a lower gear. Instantly the perfectly equalized braking power of the motor retards the car with front and back wheels tracking. If you know that helpless feeling of skidding toward the curb or ditch, such sure-footed safety must have a strong appeal.

## Master any motoring situation

With the Traffic Transmission and the Pikes Peak Motor, you are assured of absolute mastery in any driving situation. This phenomenal power plant has made Chandler the national high gear performance champion. In the way it conquers hills and responds to the accelerator in traffic—in flawlessly smooth and silent operation it will delight you always.

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$1895
*f o b Cleveland*

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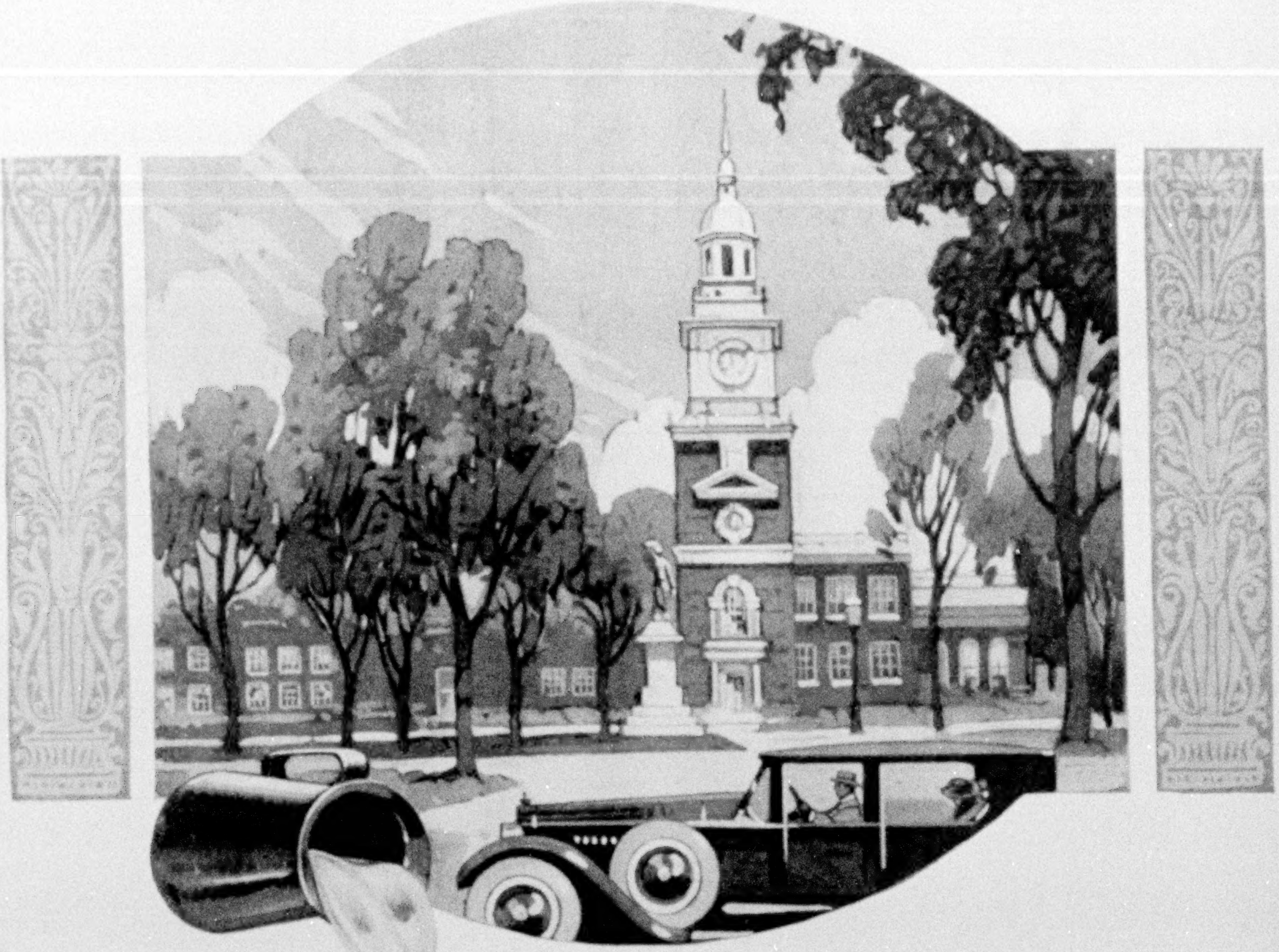

AT INDEPENDENCE HALL, Philadelphia, thousands of tourists stop to view this building that cradled our country's beginnings.

If your vacation itinerary calls for a stop-off at Philadelphia, you will be glad to learn that, going and coming, you will find the clean, clear, golden-colored Texaco Motor Oil just as available as in your home town.

You will welcome the continuance of the driving comfort that is the result of a perfectly lubricated, smooth-running engine.

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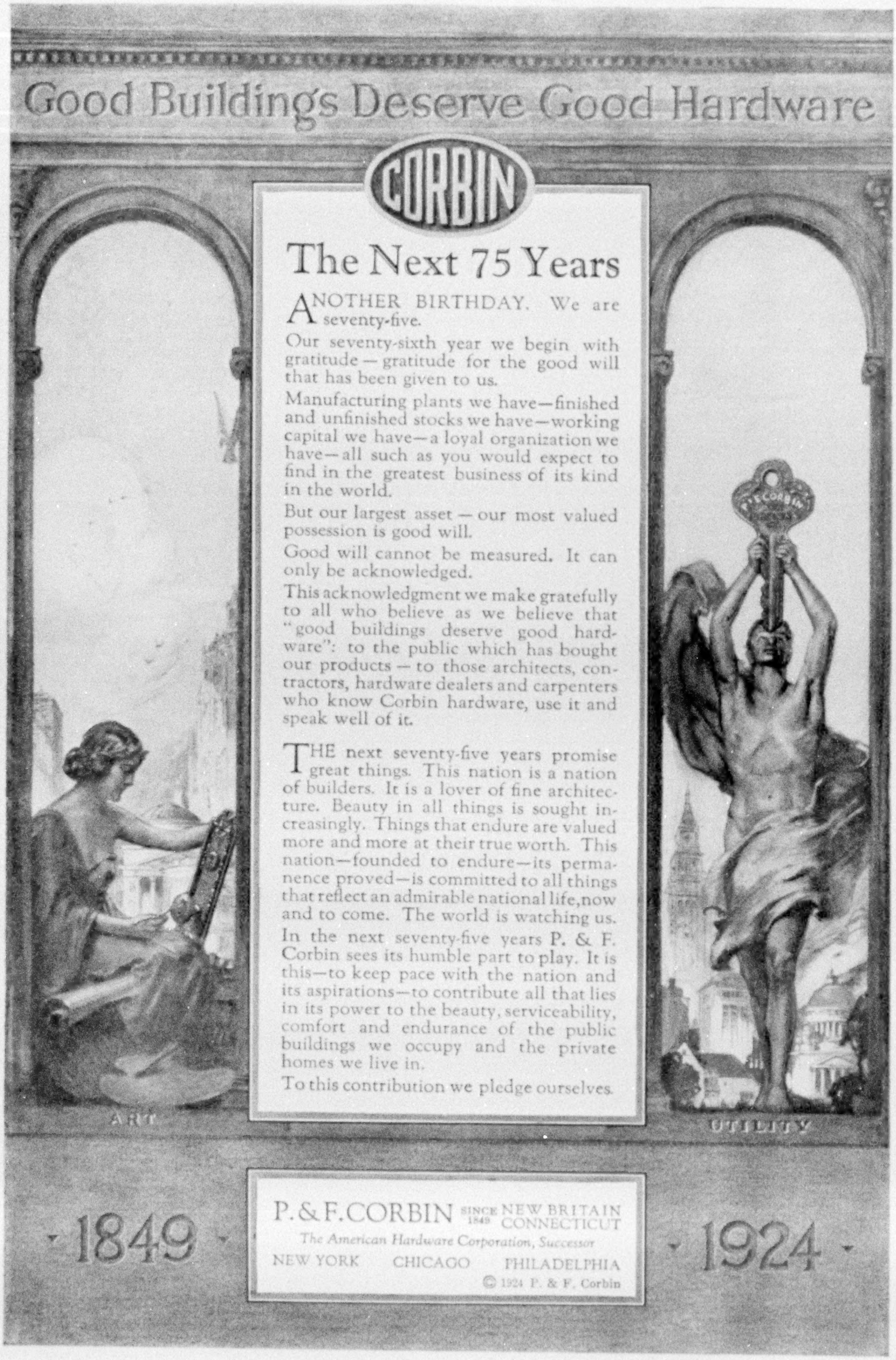

# Good Buildings Deserve Good Hardware

CORBIN

## The Next 75 Years

ANOTHER BIRTHDAY. We are seventy-five.

Our seventy-sixth year we begin with gratitude — gratitude for the good will that has been given to us.

Manufacturing plants we have—finished and unfinished stocks we have—working capital we have—a loyal organization we have—all such as you would expect to find in the greatest business of its kind in the world.

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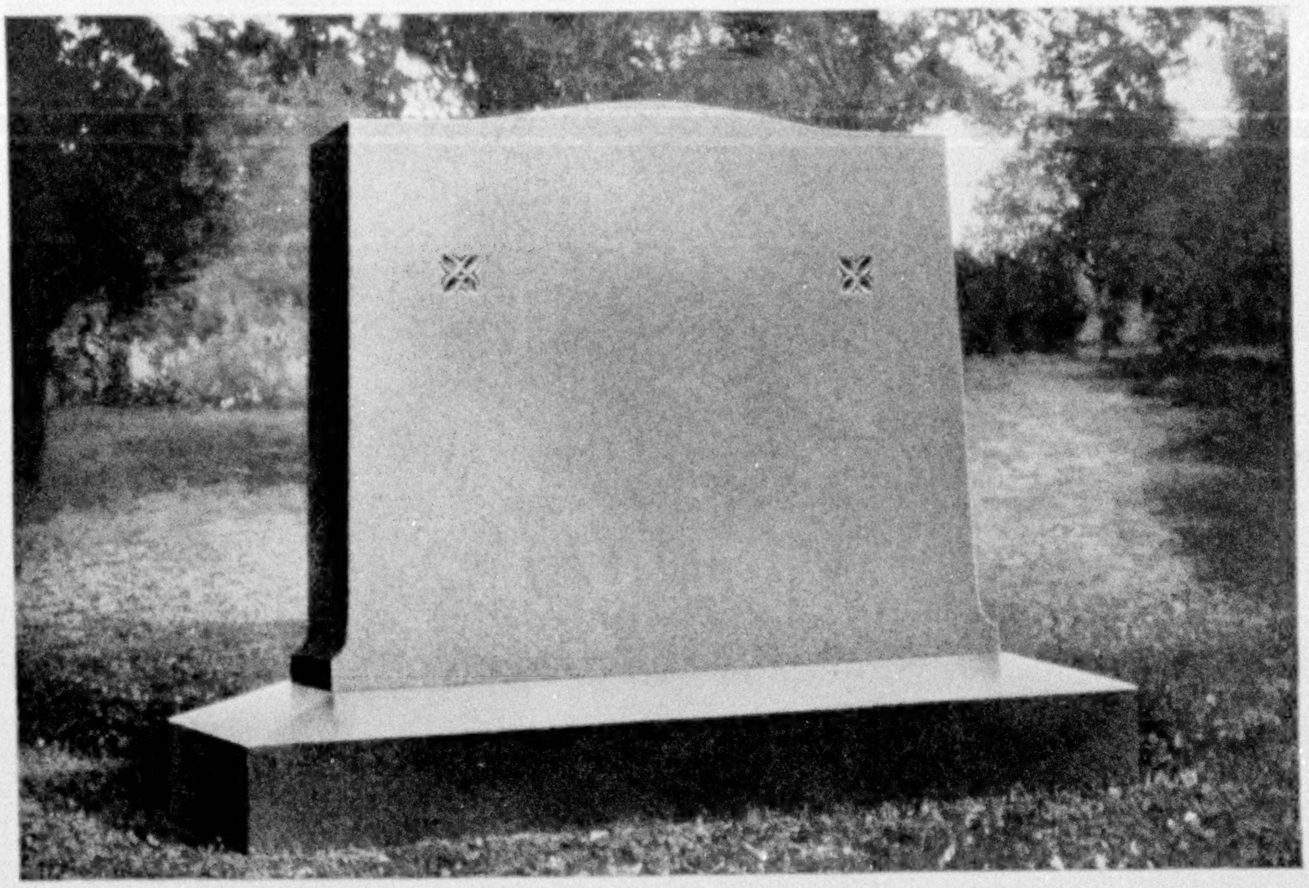

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# Yellowstone Park

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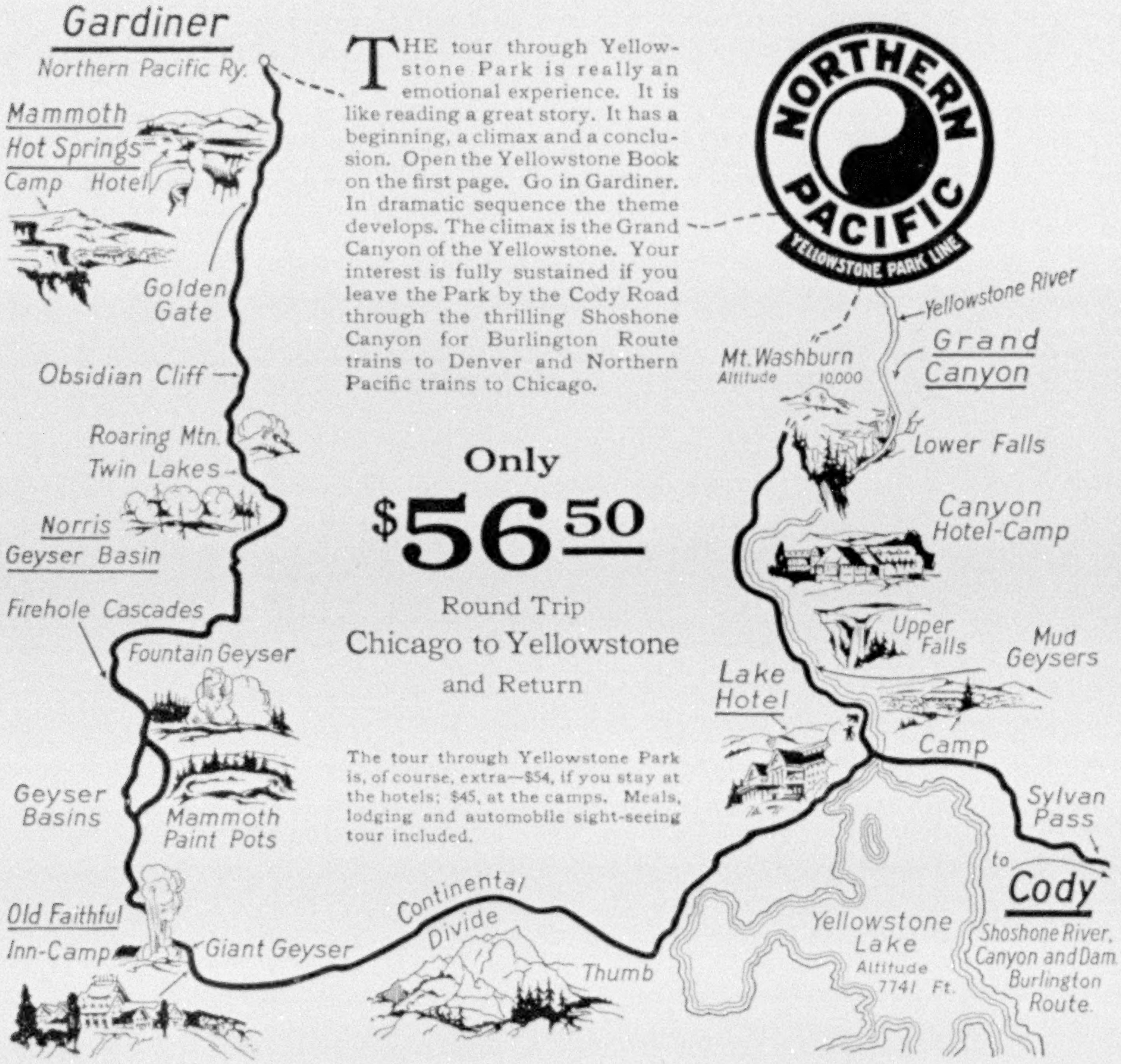
*Park Opens June 20*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Mammoth
Hot Springs
Camp Hotel
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Obsidian Cliff
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Norris
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Firehole Cascades
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Old Faithful
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Continental
Divide
Thumb
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Yellowstone River
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Grand
Canyon
Lower Falls
Canyon
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and Return

The tour through Yellowstone Park is, of course, extra—$54, if you stay at the hotels; $45, at the camps. Meals, lodging and automobile sight-seeing tour included.

If you are interested in a personally conducted, "all-expense" tour of this region, write me. Let me plan your trip.

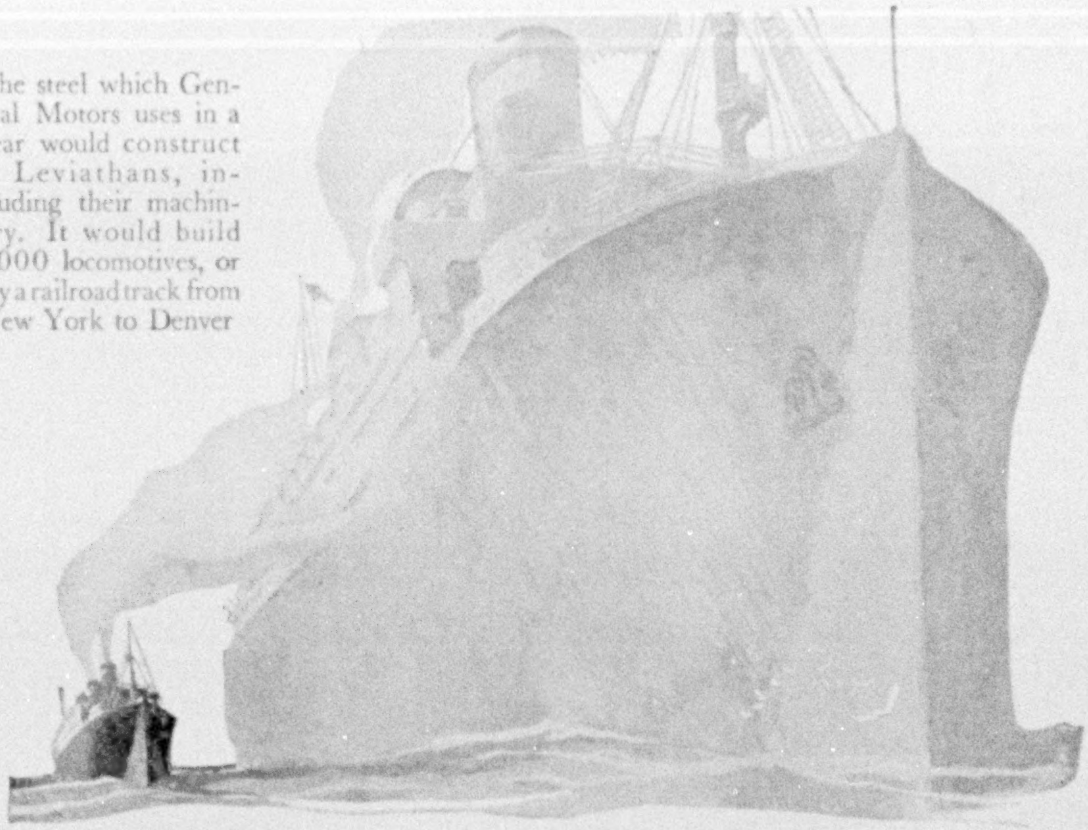
Write me for "American Wonderland", a finely illustrated book fully describing the Park.

A. B. Smith, Passenger Traffic Manager
941 Northern Pacific Building, St. Paul, Minn.

# Northern Pacific Ry.

*"2000 Miles of Startling Beauty"*

## FACTS ABOUT A FAMOUS FAMILY



The steel which General Motors uses in a year would construct 8 Leviathans, including their machinery. It would build 2000 locomotives, or lay a railroad track from New York to Denver

# 375,000 tons of steel

Many people suppose that all steels are alike. But General Motors metallurgists specify *45 different analyses of steel* for uses as varied as the sturdy frame of a five-ton truck and the delicate needle-valve of a carburetor.

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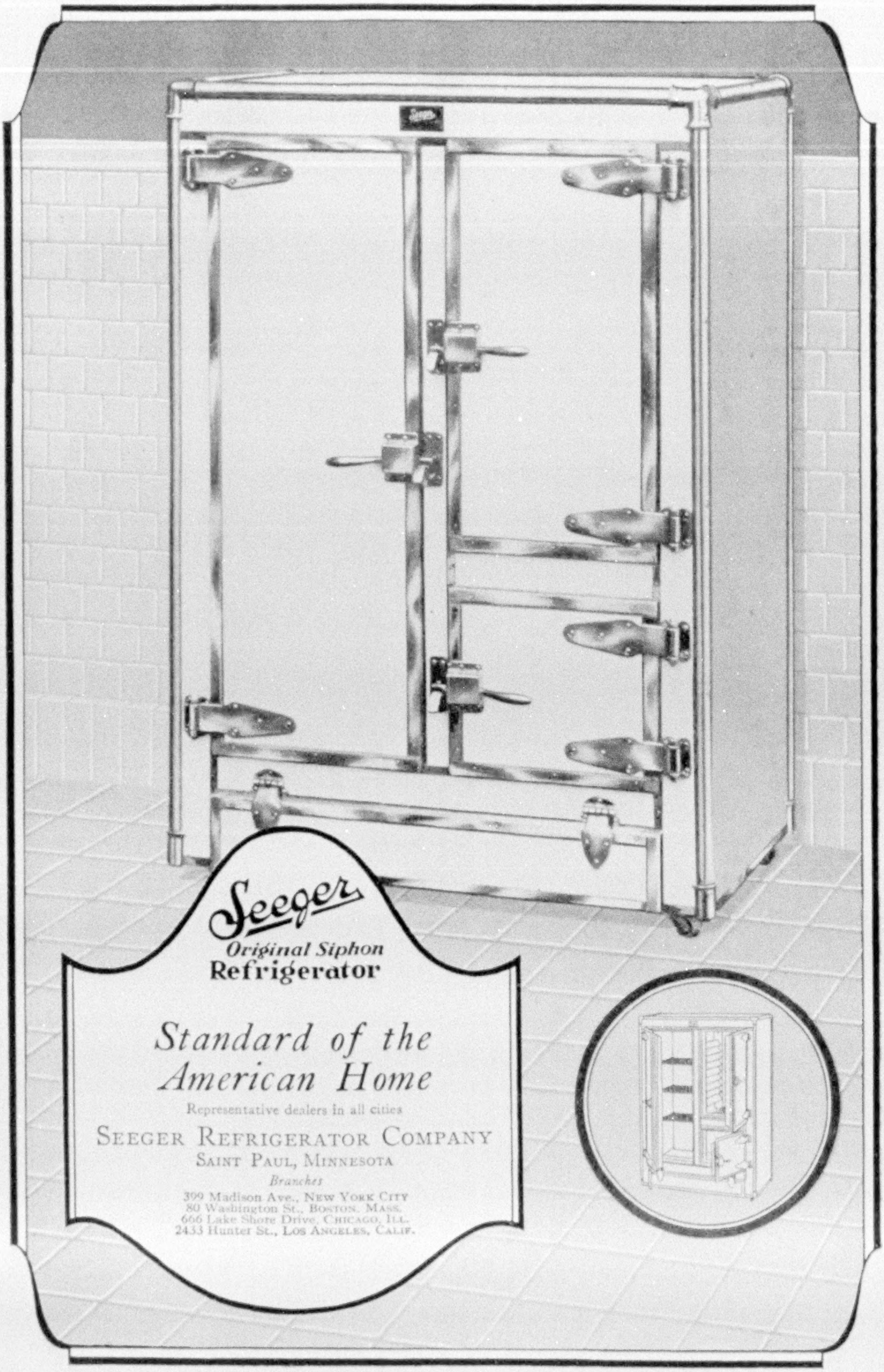

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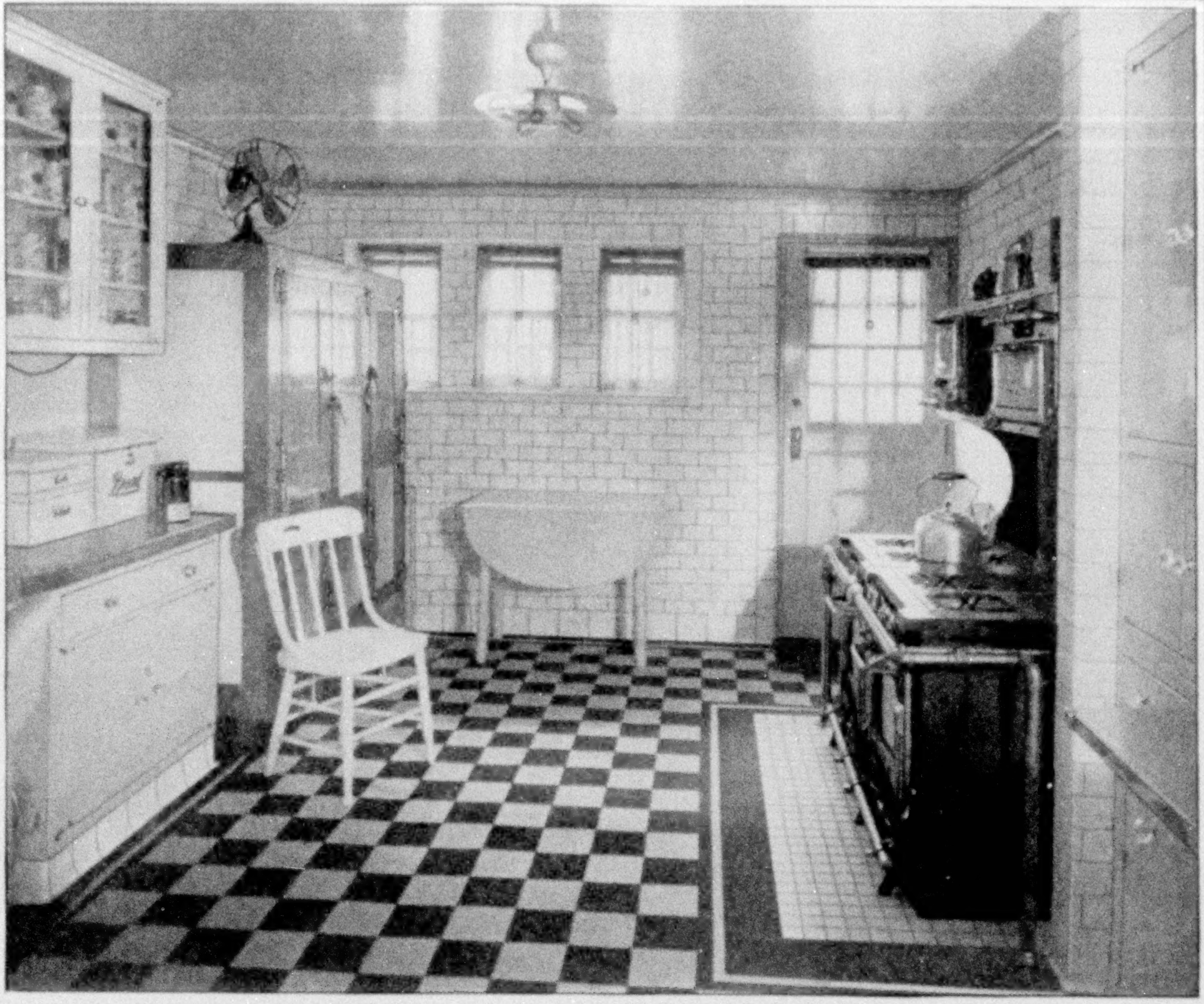

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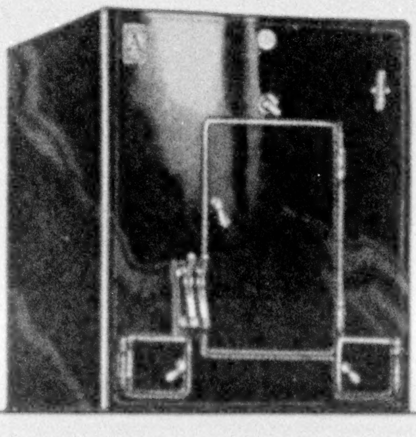
# *Why maids leave home*

Sometimes it's because their rooms are cold — a fault which an American Radiator would cure at a trifling expense.

If your present old-fashioned heating plant won't provide warmth for more radiators, take it out and install an Ideal Boiler. The one-third saving in fuel will repay the cost.

The Ideal TYPE A—the finest boiler in the world and the most economical. Send to the address below for a book about it, beautifully illustrated in color.



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COAL · OIL · GAS
## *and* AMERICAN RADIATORS
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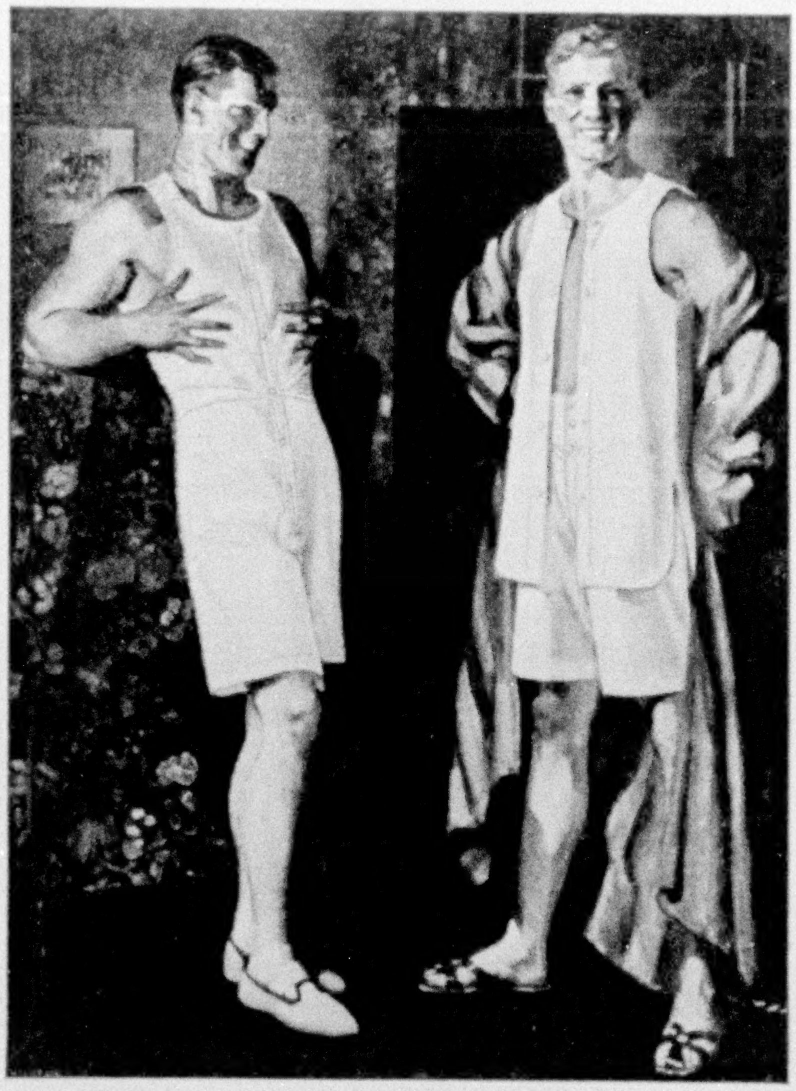
"Next to
myself
I like
'B.V.D.'
best"



For its cool comfort, long wear, and famous fit, "B.V.D." is *everywhere* the underwear of men who demand these unvarying qualities in their undergarments

*There Is Only One "B.V.D." Underwear*
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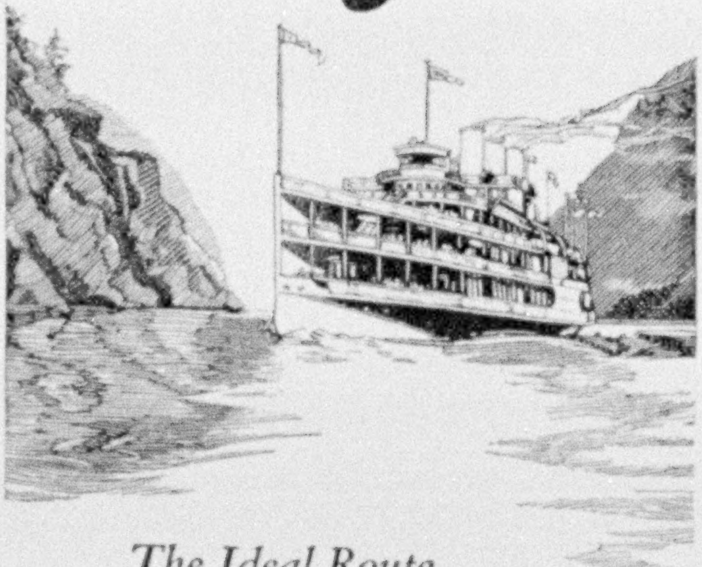

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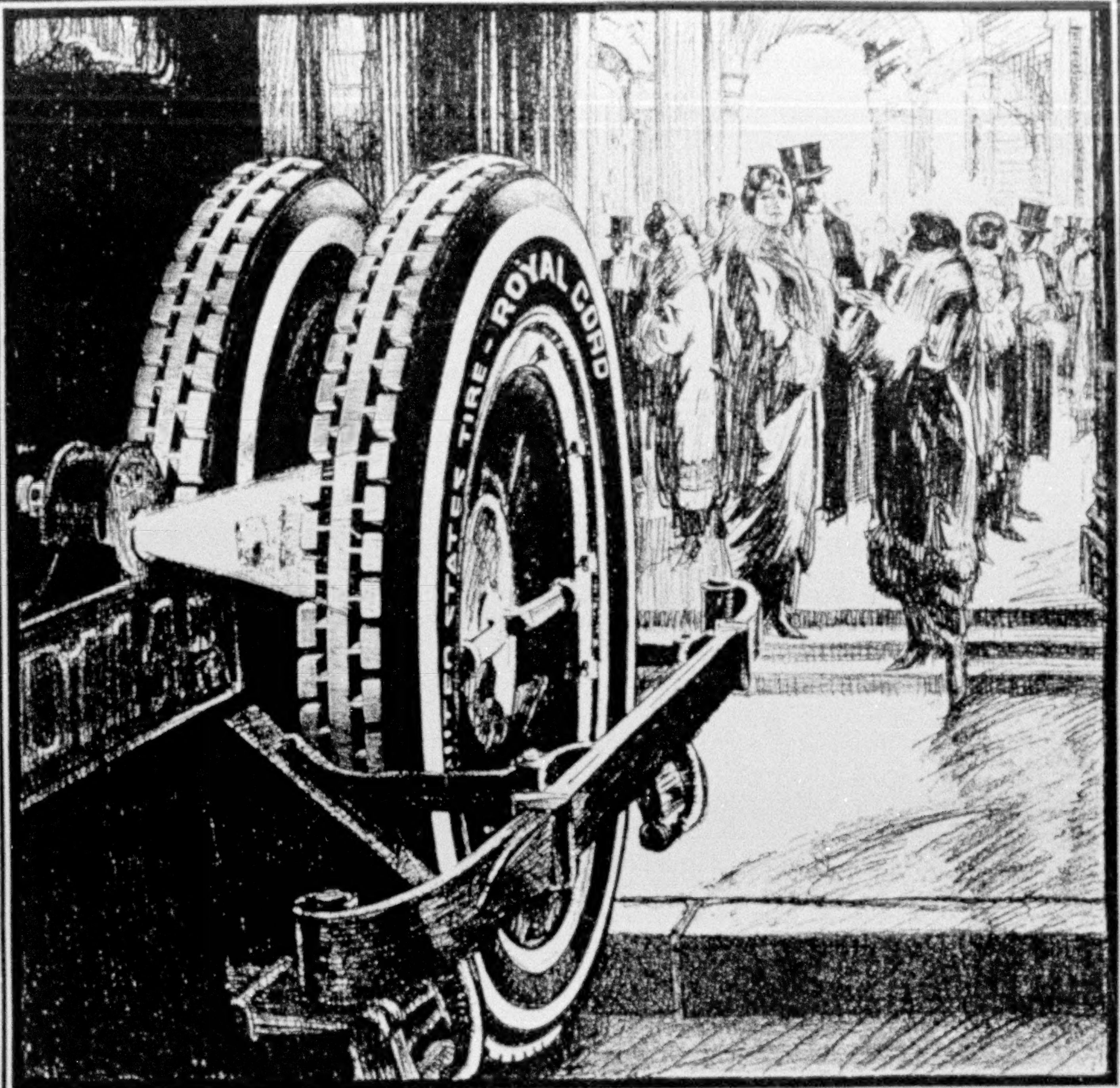
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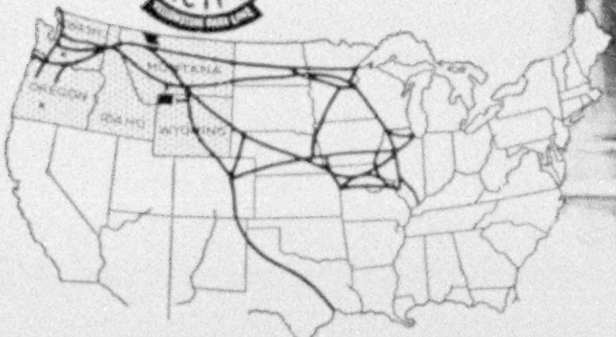
# The Pacific Northwest



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*The start of a perfect day in Glacier National Park*

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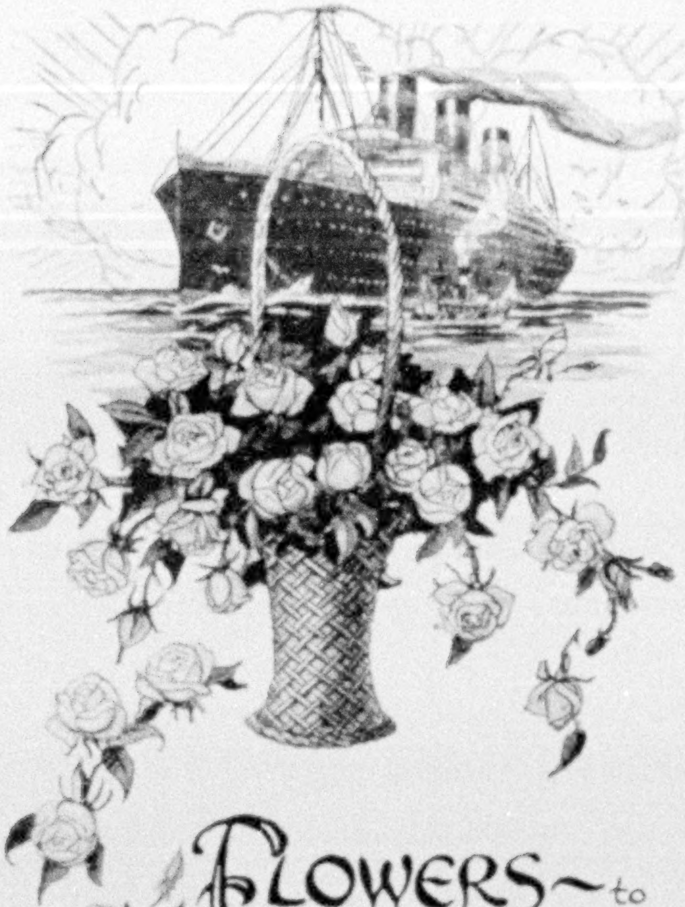

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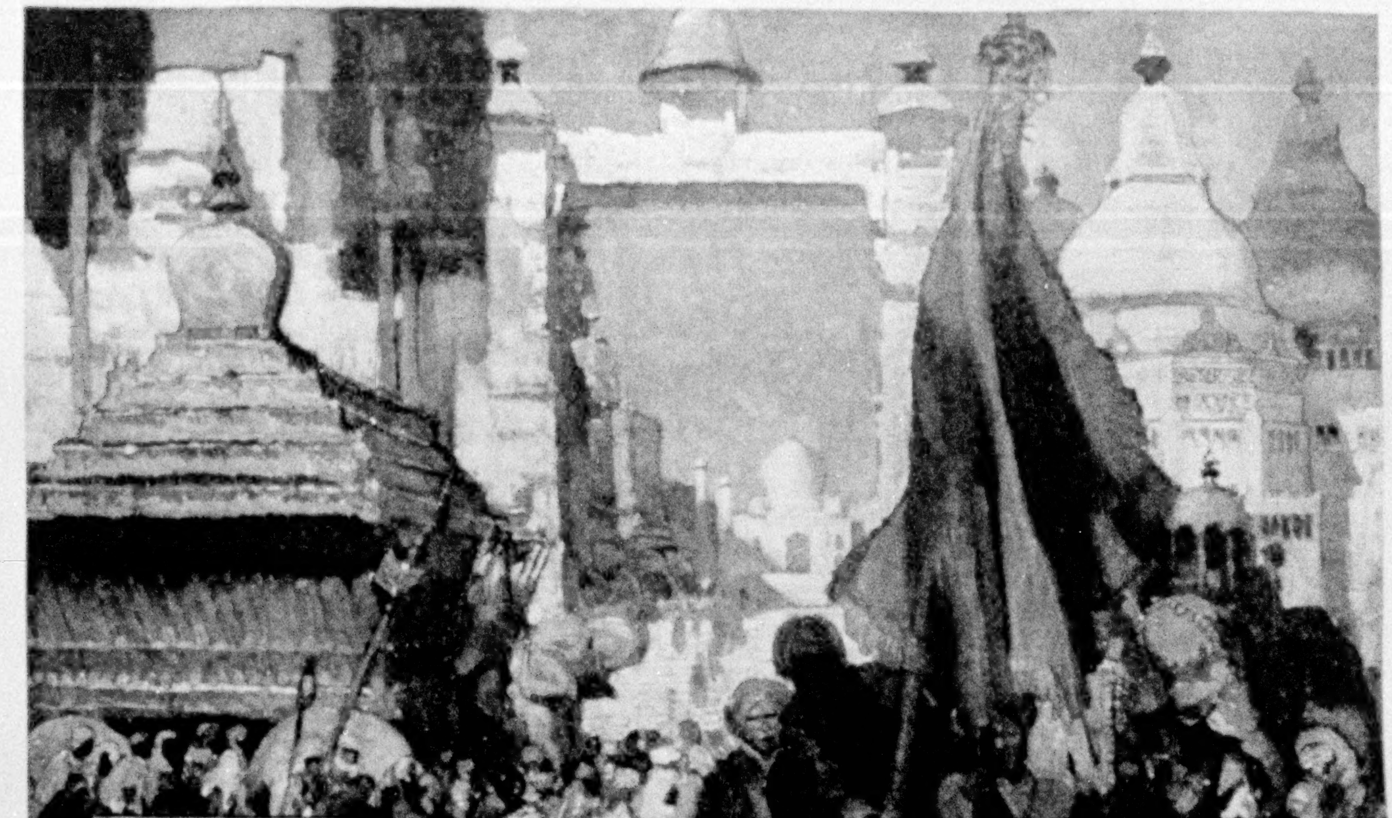

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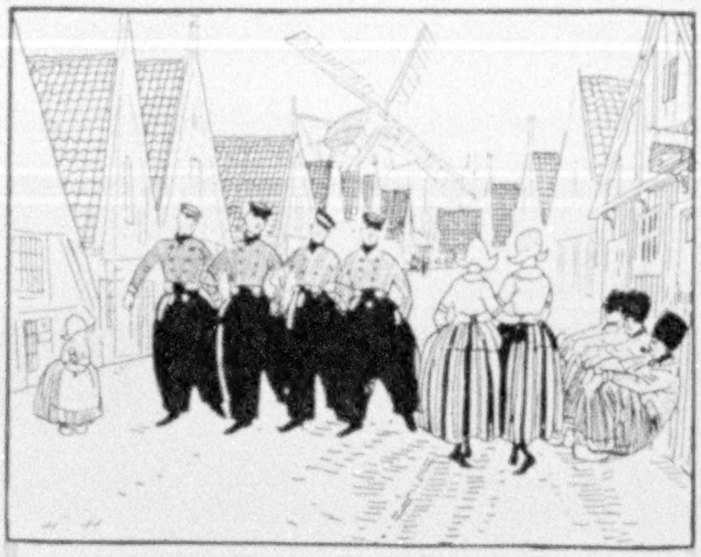

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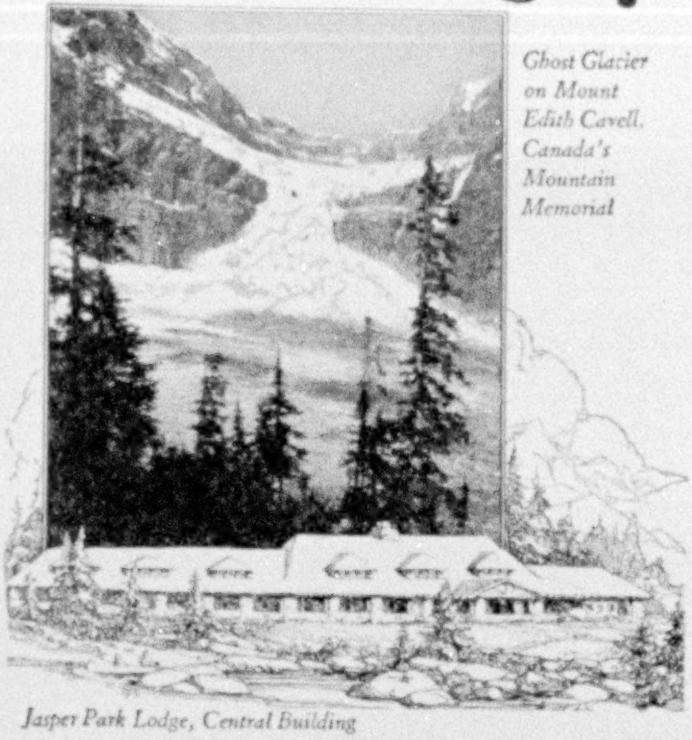
# Ghost Glacier *and the Angel!*



*Ghost Glacier on Mount Edith Cavell, Canada's Mountain Memorial*

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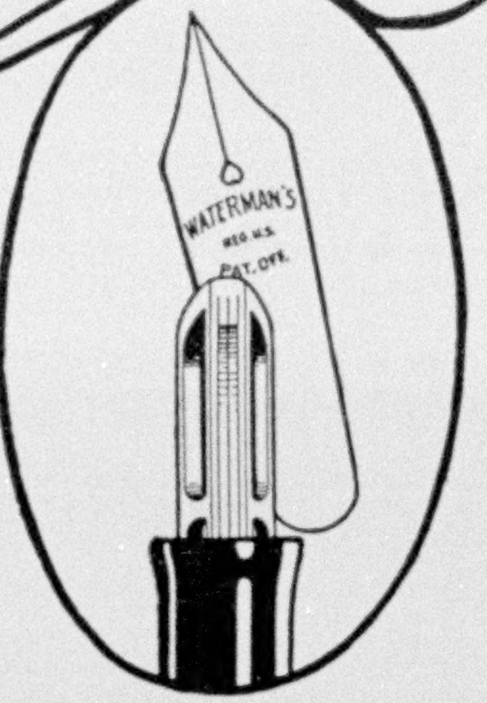
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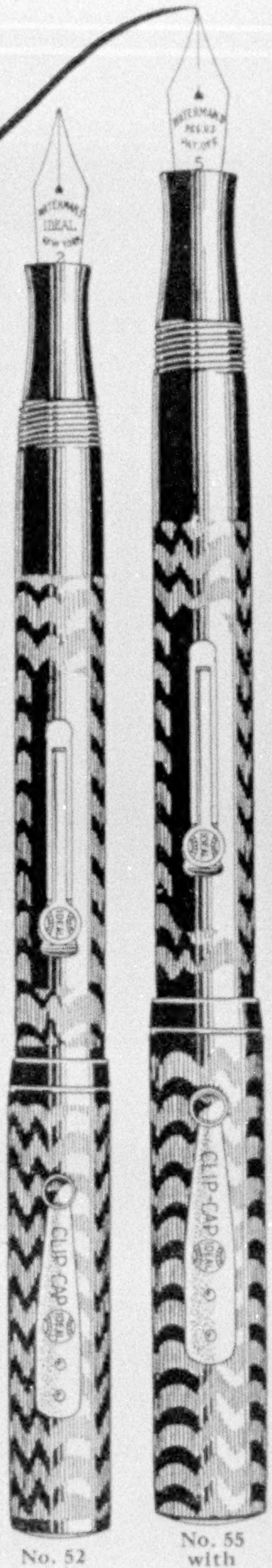

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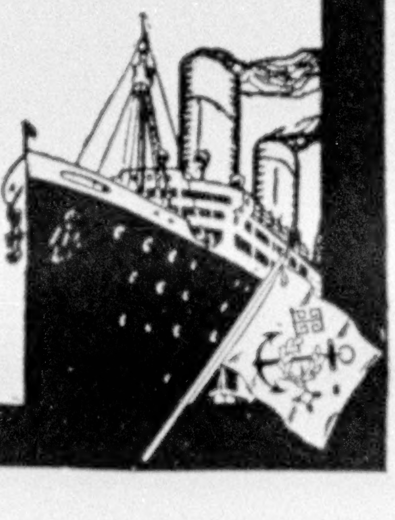
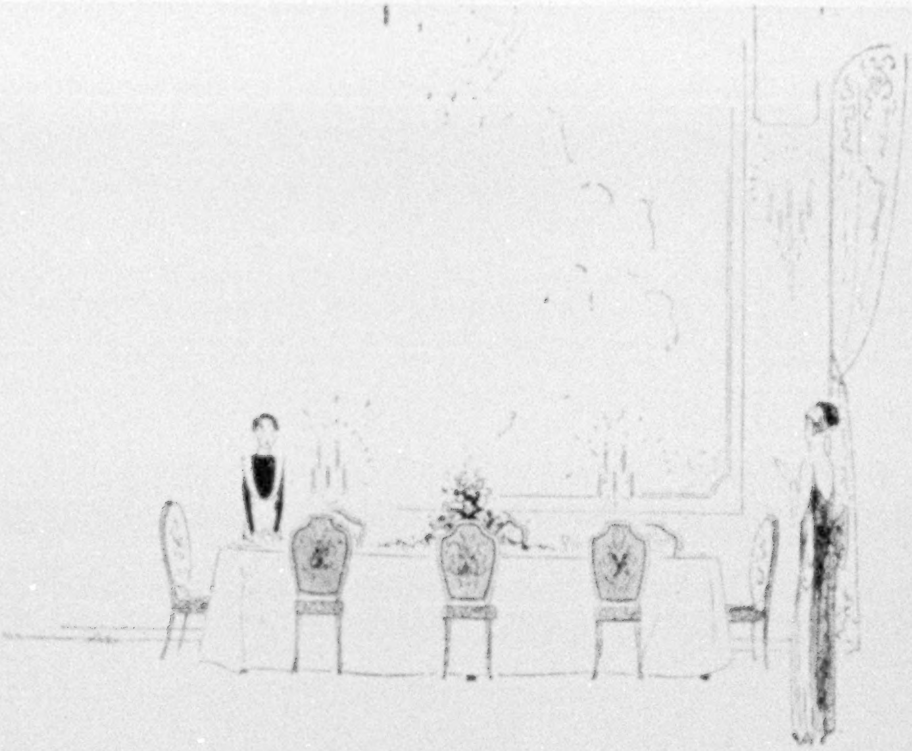


# THE MOST DIFFICULT OF TABLE EFFECTS



*SCENE: Again, she surveys the table,—through the eyes of the most critical guest, the most tasteful, the most correct. What kind of picture would it present to them? Well, the entire service is solid silver. All in her new design. Yet, not an overburden of it. Snowy linen. A few flowers. It was the simplest table she had ever set. But, yes, it had it—that rarest of table beauties—dignity, simple dignity.*

* * *

Quite the most difficult of effects to obtain in silverware is that of dignity,—simple dignity.

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Theseum has been developed in a correct dinner service. If you will write us, we shall send you a book which shows the complete, correct service, and give you the name of the nearest jeweler who can show you actual pieces. Address Dept. 4-85, International Silver Company, Meriden, Conn.

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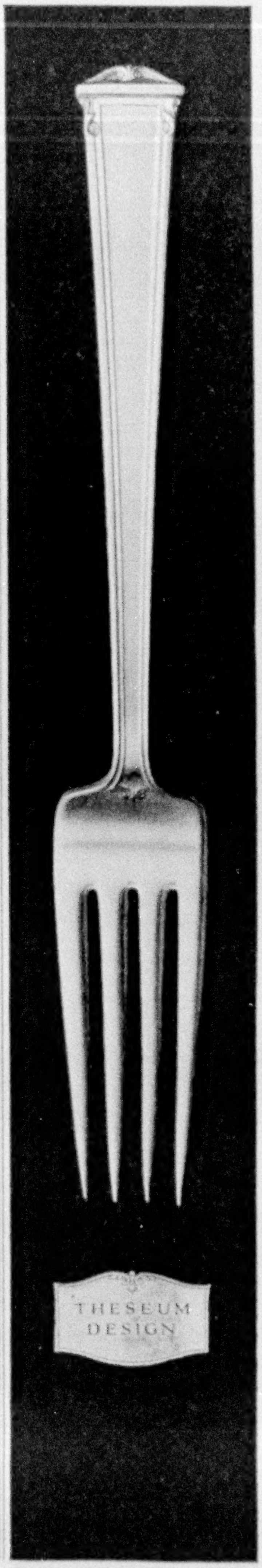
**INTERNATIONAL SILVER CO.**



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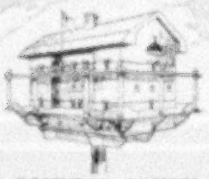

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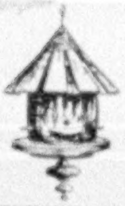

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# Sunshine or Shadow?

LUCKY boys and girls—graduating this month! Born lucky because God gave them fathers and mothers who have the love, the courage and the financial ability to see that their children are properly educated.

It is hard to believe that any father could care so little about the future of his children that he would let them give up school and go to work too soon if he could possibly prevent it.

And yet, right here in the United States where children are supposed to be better cared for than anywhere else in the world, there are more than 1,000,000 children between the ages of 10 and 16 at work—many of them laboring at health-wrecking and mind-dwarfing drudgery in factories, mines, shops and mills, on farms and in cities!

* * * *

All of the experts on health and education agree that children should be kept in school until they are at least 14. Every right-minded man and woman will agree on that point. Whether or not some children between 14 and 16 should drop all study and go to work is a grave question. But no one will deny that all of these youngsters need hours for play while they are growing—for the right play helps to build strong, healthy bodies. Now what are the facts? Here they are, furnished by the United States Census Bureau:

378,063 children between the ages of 10 and 14 are at work.

682,795 children between the ages of 14 and 16 are at work.

Remember, the Census figures show only those children reported by fathers and mothers. Investigators know that there are thousands of children from 4 to 10 years old whose work at home is hidden from the Census takers. No one can know the exact number.

All through these bright sunshiny days when the beautiful green world is calling boys and girls to come and play—they drudge—perhaps a half million of them—mere children.

* * * *

Poor little souls, many of them doomed to live in the shadow of poverty and ignorance all their lives—what chance have they?

The number of children who are injured at work is appalling but not surprising. Children must play and when denied their rightful opportunities, they will play at their work and get hurt.

Most of us like to look on the sunny side of life—and so we should. But while we are planning for the happiness and welfare of our own boys and girls, can't we give just a few minutes' thought to the little toilers condemned to misery unless we help? Thousands of them can be developed into splendid men and women—if they are rescued now. Bring them out of the shadow and into the sunshine.

THE LIGHT THAT NEVER FAILS

Generally speaking—the states that give their children no protection or next to none have the greatest number of illiterates. They pay the price of their exploitation. Child labor in the United States has grown to alarming figures and will continue to grow until public opinion and humanity order it stopped. And apparently the only thing that can stop it everywhere and at once is the Child Labor Amendment to the Federal Constitution.

The time is coming when every state will be called upon to ratify the Amendment. Be ready to do your part to have it sanctioned by the Legislature of your state. It is a measure that should have your heartiest support.

HALEY FISKE, *President.*

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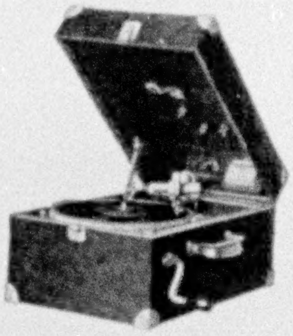
| Blue Danube Waltz | 6237 | 2.00 |
| Invitation to the Waltz | | |
| Hungarian Rhapsody, No. 2 | 6236 | 2.00 |
| Largo from "New World" Symphony | | |



Victrola No. 50 (Portable)
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COATES
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To compare the art of one country with that of another may prove little, but it is one of the most frequent impulses. Therefore no collection of Victor Records is complete without a number of examples of the art of Albert Coates and the Symphony Orchestra, which represent at their best the efforts of a great orchestra playing within the influence of European taste. Among the sixteen selections we suggest:

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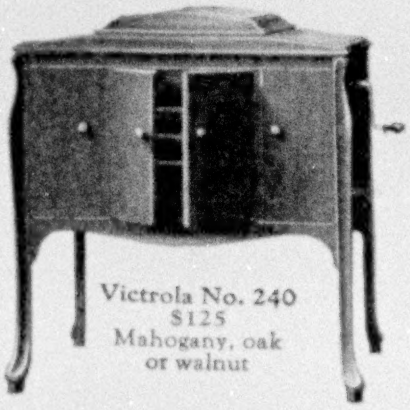
| Symphony in A Major, No. 7—3rd Movement | 55174 | 1.50 |
| Symphony in A Major, No. 7—4th Movement | | |



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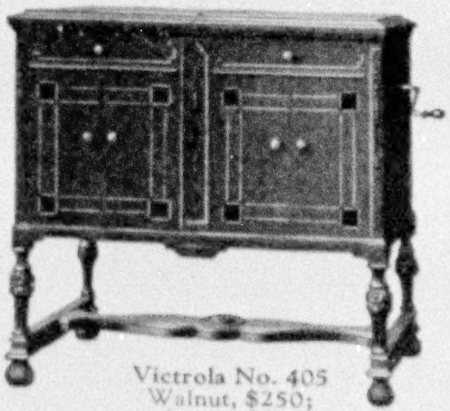

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# EXPLORING THE MYSTERIES OF PLANT LIFE

By William Joseph Showalter

Author of "Exploring the Glories of the Firmament," etc., in the National Geographic Magazine

ALL the factories, all the railroads, all the mines, all the automobiles, all the activities of man of whatsoever nature that require power, do not utilize as much energy as is developed by the plant world.

Out of intangible sunshine, insubstantial air and clear water, coupled with a modicum of mineral matter from the soil, plants must manufacture all the food that keeps alive the innumerable hosts of animals of the earth, store up all the heat that keeps humanity warm and cooks its food, furnish most of the power that drives its industries, and provide the raw material for all the clothes mankind wears and many of the products of which his factories, his houses, his furniture, and his books are made.

Would you know how much of a plant is fabricated of sunshine, air, and water, and how little of solids from the earth? Then burn that plant and notice the thin layer of ash remaining. All else has been made up from subtle sunbeams, thin air, and plain water.

Every plant, from a simple moss to a giant tree, is in reality a vast household of individual entities working together, in fine coöperation and close harmony, to a common purpose. One group pumps up the water required by the community, which is carried to the points where it is needed by another group.

Others, respectively, obtain the solid food from the ground, mix it with air, sunshine, and water to make a substantial dish; carry the food to the various parts of the household; store up the leftovers; build additions to the house; and prepare to send out colonies from the parent rooftree, fully "grubstaked" and equipped to gain a foothold wherever they may settle down.

One observer sees the individual plant as a counterpart of a busy little city, teeming with life and bustling with industry. Here goes on the pulling down and building up characteristic of progressive communities; the streets and alleys are thronged with workers; here are dairies and milkshops dispensing their supplies; jewelers' shops preparing crystals; sugar refineries manufacturing sweets; starch factories storing foodstuffs; perfumers' laboratories distilling scents; varnish-makers developing resins and waxes; color establishments preparing dyestuffs.

### DIVERSITY IN SIZE, FORM, AND HABIT

As diverse in their form as in the activities of their cells, the plants and flowers of the world exhibit every gradation in size from the big Sequoias of California and the great Eucalyptus of Australia to the tiny germs of tuberculosis and the microscopic bacilli of typhoid. They show every variation of form from graceful trees and airy blossoms to unfashioned slime molds and unorganized fungi.

They reveal every combination of color from the deepest red to the richest violet. They present every kind of texture from

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Photograph by Harry F. Blanchard

FLOWER SECRETS

the ivory-hard seeds of palms to the jelly-soft fronds of seaweeds. They disclose habits that range from bold and beautiful independence to insinuating and crass parasitism.

The ability of plants to live and work under adverse conditions and to adjust themselves to their environment is one of the marvels of creation. Some two hundred thousand species have been catalogued and described, and they have adapted themselves to every conceivable sort of environment.

Some live in water, others in desert places; some rejoice in eternal sunshine, others prefer polar cold; some choose the seashore, others select the mountain peak; some thrive on thin air, others dwell in caves; some inhabit the human body, others have learned to thrive even where air is entirely absent. Some, indeed, find hot springs to their liking, and others begin to cover a new volcanic lava flow almost as soon as it ceases to glow.

Dependent on outside agencies for fertility, they call the winds to their service, enter into reciprocal relationships with insects, and develop devices of a high mechanical order.

Rooted to the ground, they are, next to man, the world's most eminent colonizers, drafting the winds, the waters, birds, animals, and even man into their schemes of dispersal.

Unable to run away when attacked, they have set up innumerable forms of defense for their protection, such as the thorns of the rosebush, the prickles of the thistle, the acrid juice of the goldenrod, and the poison of the mountain-laurel.

### PLANT ANIMALS AND ANIMAL PLANTS

Kinship between animals and plants is so close that one finds between their respective kingdoms a twilight zone where animals are so nearly plants and plants so nearly animals, that biologists speak of plant animals and animal plants.

Even in their respective responses to outside influences, this close kinship is attested. Touch the eye of a frog and the eyelid closes; touch the hairs of a Venus flytrap and the leaf closes. Etherize the frog and the leaf and neither the frog's eyelid nor the flytrap's leaf will close. Remove the ether and both will recover their sensibility.

The varied and ingenious methods by which the flowers reproduce their kind and maintain the life of their several species, while the individuals die, are of paramount interest.

There are some plants, such as bacteria, which multiply by simple division. Others develop bulblets which take root and grow, like the lilies. Still others develop suckers, runners, and stolons, as in corn, strawberries, briers, and the like.

### FLOWERS NOT PRIMARILY FOR OUR PLEASURE

But sexless reproduction is the exception and not the rule. Most plants are reproduced by "setting seed," and these always have flowers.

Once it was thought that these flowers were made chiefly, if not wholly, for the pleasure of human senses. To-day we know that the manifold varieties of floral forms we see are mainly devices developed by the plant to secure the perpetuation of the species.

They must protect their tender stamens and pistils; they must attract the insects that serve them and compensate the service; they must repel the insect "spongers" who would live at their board and render no service. They must employ other vehicles to secure fertilization.

It is to meet these conditions that the flowers have developed the calyx, or bud covering; the corolla, or petal series, and all the other parts of the blossom in the infinite variety of design and arrangement that we know.

"A living machine for making seeds," the flower has been called, and the essential parts of this machine are pistils and stamens. To fertilize the ovules of the pistil with the pollen grains of the stamen, and thus to start the "promise of the plant that is to be," is the flower's problem.

Less virile flowers, possessing both stamens and pistils, fertilize themselves. More progressive ones, also having both stamens and pistils, scorn self-fertilization, and in others the sexes are so separated that stamens and pistils occur in different flowers or even on different plants.

Some of these employ the wind and

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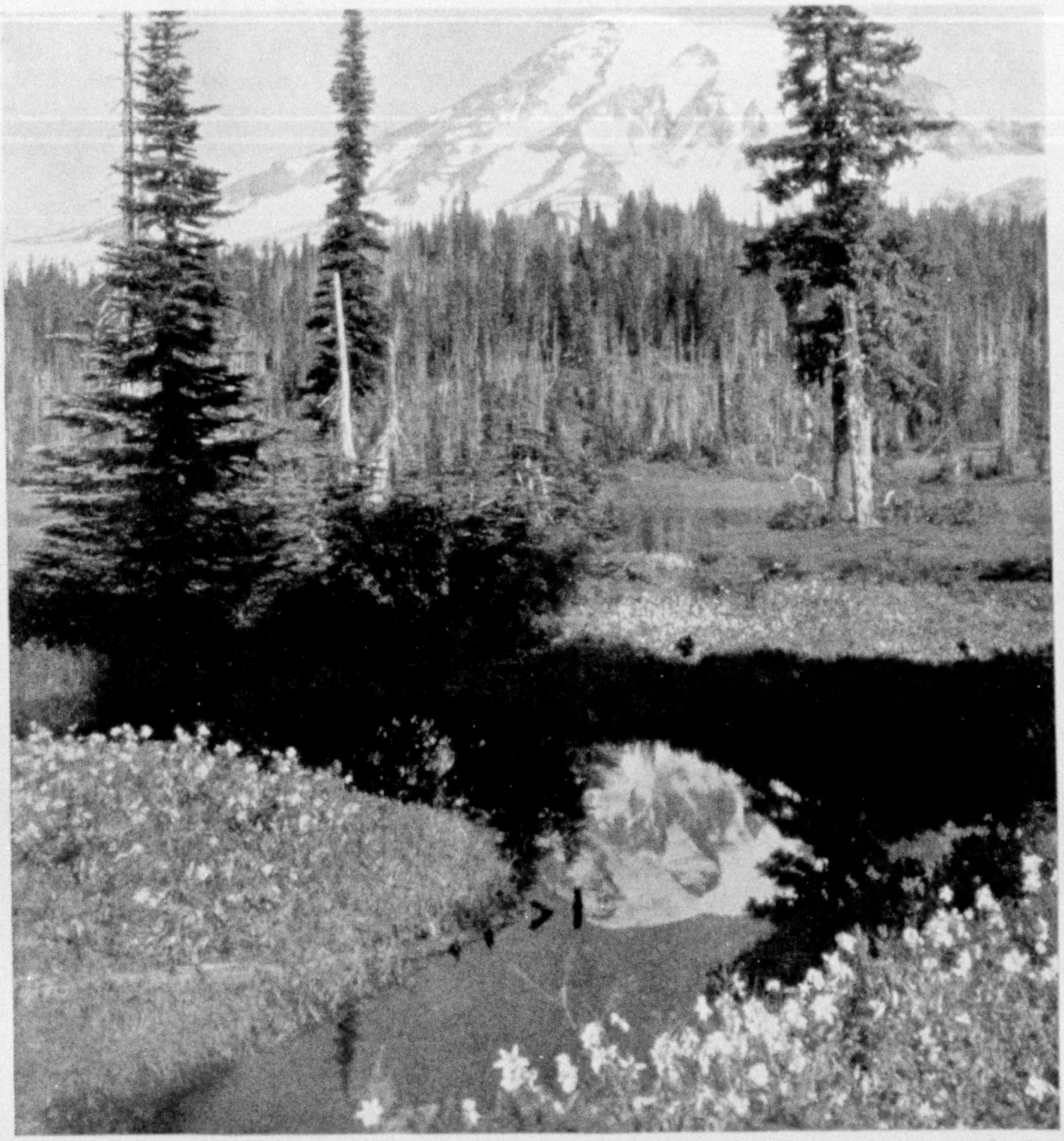
DESPOILING A DOGWOOD TREE

The wild flowers are gradually retreating before the persecution of the city dwellers, which has been intensified and extended by the advent of the motor car.

© Ernest L. Crandall

LOADING DOWN A CAR WITH WILD FLOWERS

Many communities are organizing wild-flower preservation societies to save the flowers of much-frequented woodlands from extermination at the hands of those who ruthlessly destroy them after this fashion.



© Asahel Curtis

FLOWERS AROUND REFLECTION LAKE, MOUNT RAINIER NATIONAL PARK

The little protoplasts that build the myriads of cells which constitute a plant are all as much alike as peas in a pod; but some of them build roots, others stems, others leaves, and still others flowers. They divide their labors as systematically as the best human community.

the water as messengers for carrying pollen from mature stamens to receptive pistils. Such flowers are rigid economists except in the matter of pollen, of which they are profligate spenders. Insects might be attracted by pleasing odors, bright colors, and sweet nectar, but the wind and the water pay no attention to such things. So color, scent, and sweetness are absent.

But there is greater need for pollen, since wind and water are poor messengers and must be loaded down if any of the pollen is to reach its proper destination.

### THE WATER PLANTS' PROBLEMS

Some of the water-fertilized plants have had to adapt themselves to fertilization under water, and hence have provided themselves with pollen of the same specific gravity as water. Others must be fertilized at the surface, and these launch their pollen grains on floating rafts. The water-living grass-wracks pro-

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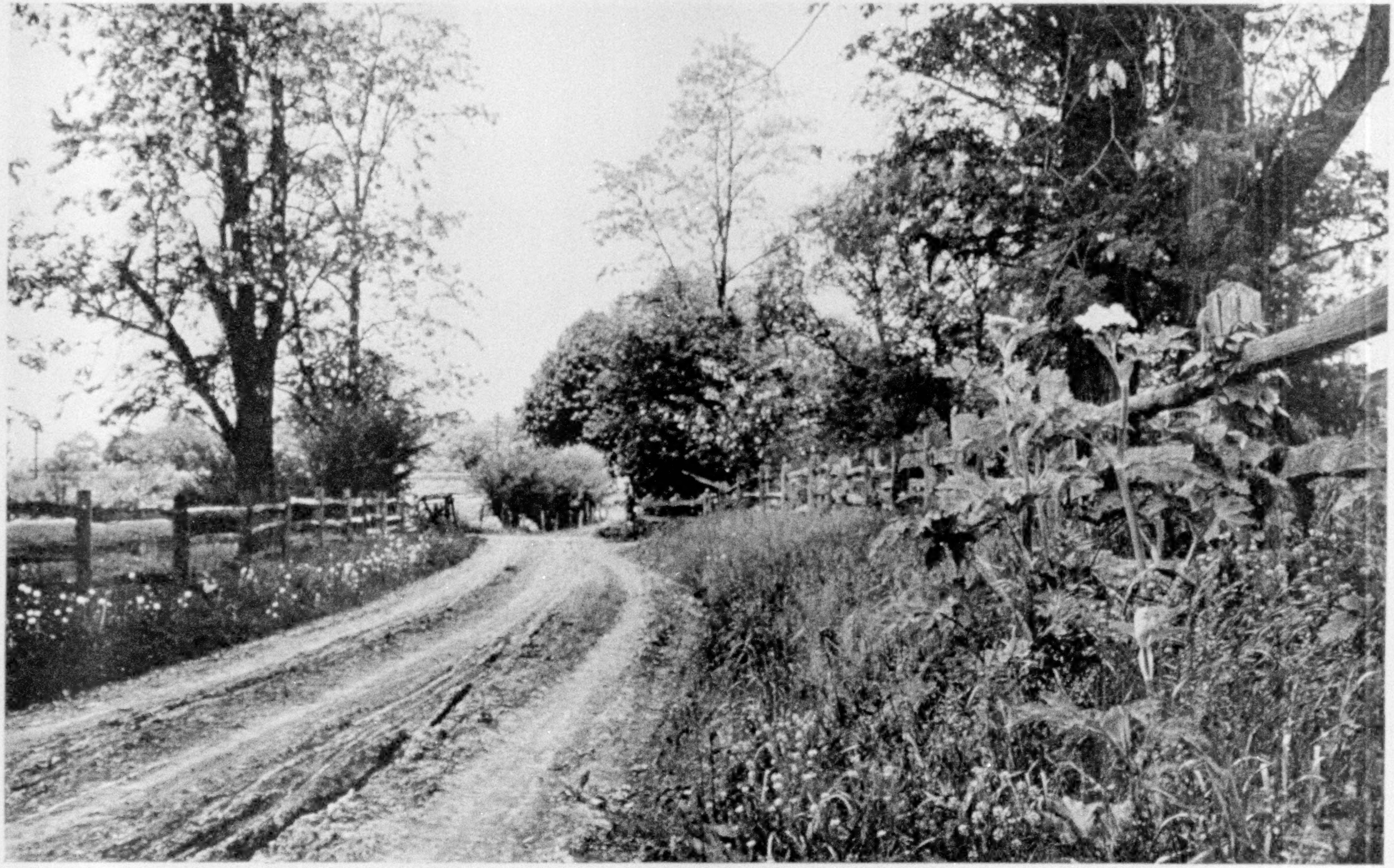
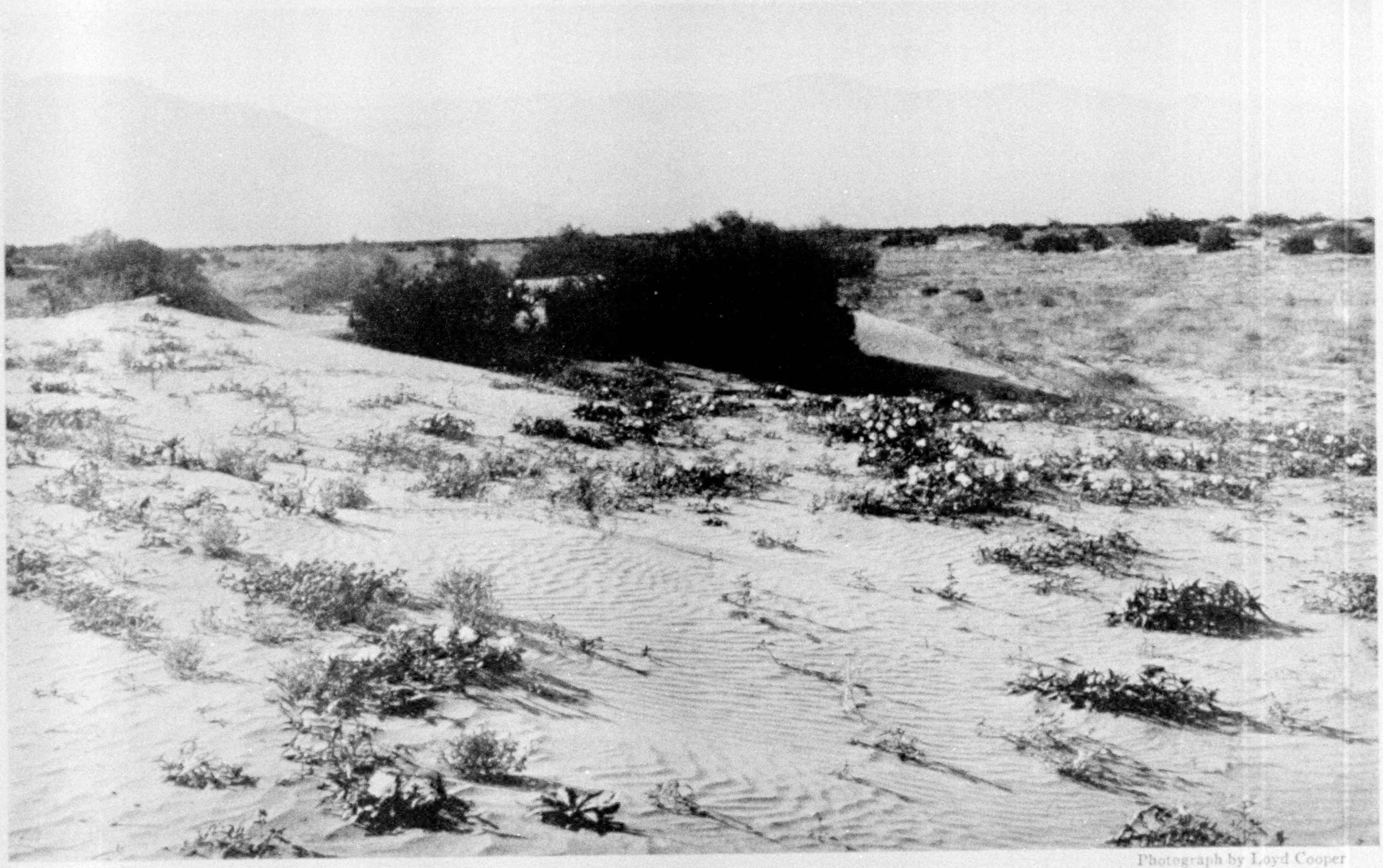


Photograph by Martha Bunting

A COW-PARSNIP BY THE ROADSIDE (IN THE RIGHT FOREGROUND)



Photograph by Loyd Cooper

DESERT FLORA IN CALIFORNIA

Nowhere do plants more clearly illustrate their adaptation to environment than in the desert. With their fight for existence so bitter, they must go the limit in protecting themselves against animals. Distasteful secretions are unusually abundant in desert plants and spines and prickles the rule. Some, like the living-rock cactus, even employ the art of camouflage to protect them from the animal allies of drought.

Photograph by Mary Beal

WHITE SUNDROPS AND PINK ABRONIAS ON THE MOHAVE DESERT, CALIFORNIA

In man's laboratories a temperature of about 2,400° F.—enough to melt pig iron—is required to separate the carbon and oxygen atoms of the carbon dioxide molecule. The plants, in their little cell laboratories, are able to separate them without difficulty.

duce pollen grains that become threads after leaving the anthers.

When the water-living tasselgrass matures its pistils and stamens in separate flowers, their stalks suddenly shoot up to the surface of the water, no matter what the depth, and the staminate flowers there spread their pollen abroad.

But the most interesting of all the water-living plants in the matter of fertilization is the familiar wildcelery. The female flower raises its head to the surface on a long stalk, but the male flowers remain entirely submerged until the time for fertilization comes. Then their buds detach themselves, float to the surface, and curve back their sepals, so as to make a raft for their two perfect stamens. These float about until they meet the female flowers.

Once the female flower is fertilized, the flower stem contracts and the flower is drawn beneath the surface, where it matures its seeds.

The wind-pollinated plants include many of the forest trees and most of the grasses. The pines with their cones, the hazels with their lamb's tails, the broad-leaved docks and the ordinary sheep sorrel with their pendulous flowers, the plantains and sedges with their scapes, the rye with its beard, are examples of wind-pollinated flowers.

A little farther up the line of floral development we find species of plants in the very stage of transformation from wind-lovers to insect-lovers—from anemophilous to entomophilous plants, as the botanists would say.

The flowers that are insect-lovers are

usually beautiful, fragrant, and sweet, for they must appeal to the insect's senses of sight, smell, and taste.

### FLOWERS ARE DELIGHTFUL HOSTESSES

They make fine hostesses. As one writer has charmingly put it, they not only decorate their houses in delightful colors, perfume the palatial walls with gracious scents, and powder their pretty faces with golden pollen, but, accepting the ancient proverb that entertainment does not reach its climax until bread is broken with the guest, they provide rich viands of sweets.

However, they must be careful not to overfeed their guests, lest, sated, these would linger too long and not respond to the other invitations that are essential to carrying out the flowers' designs.

Likewise, they must bar their doors to the unbidden visitors that, unable to render service in return, would clutter the receptions and spoil their parties.

This problem is met in various ways. Many of the gentians use the opposite leaves to form collars to prevent the walkers from reaching the door. Others, like the snowdrop, hang their heads, so that the creeping creatures can't get in, and only the winged folk can call.

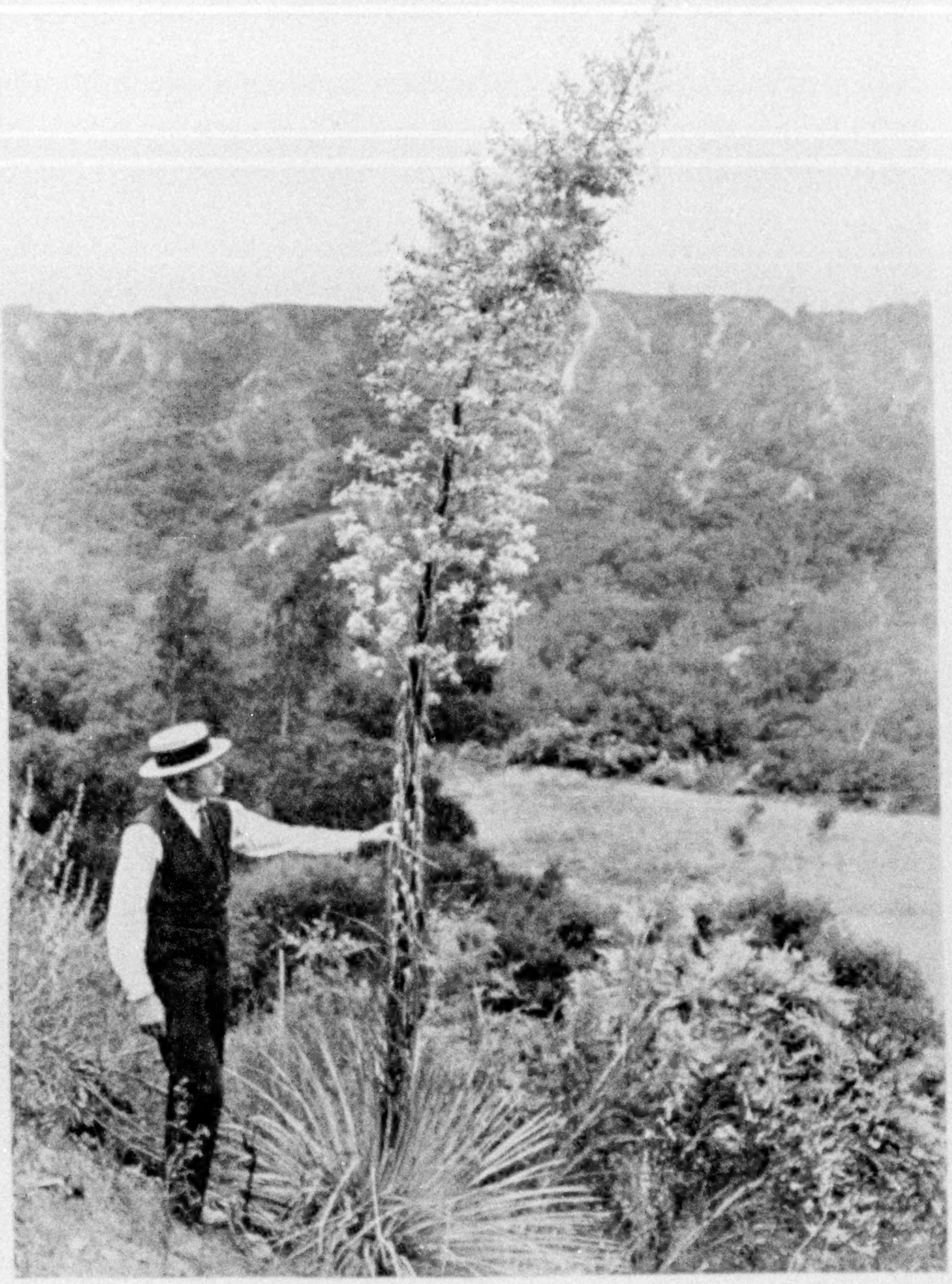
Some provide down-curving hairs along the stem, which form an abatis against the unwelcome guests. Some, like the verbenas, even place hairs on the flowers themselves.

Many of these unwanted guests are so persistent that they would steal in at the back door if they could, and some of the flowers thwart this maneuver with a swelled calyx that keeps the nectar safe, even if the walls are gnawed through.

Honeysuckles and similar plants constrict their corollas, so that only the insect with a long tongue can reach the sweets at its base.

Flowers like the toadflax and the snap dragon have masklike corollas, which close the door of the banquet hall to all visitors that have not the strength to push them ajar.

Sticky secretions along the stem and on the calyx form another device that some of the flowers, among them the catchfly,



Photograph by Alexander Wiederseder

A FINE SPECIMEN OF THE CHAPARRAL YUCCA: CALIFORNIA

The story of the relations between the yucca plant and the yucca moth constitutes a marvel of biology (see text, page 592).

Photograph by William H. Zerbe

IN THE GOOD OLD SUMMER TIME

Some plants seek dry places; others are waders that will not thrive if their feet are not in the water. With their likes and dislikes, they neglect neither the blistering desert, the snow-capped mountains, nor the boggy swamp, softening every landscape and cheering every prospect.

XUM

use to keep out the uninvited.

The tutsan-leaved dogbane, which is called the fly-gulper by the French, causes its stamens to nip the intruding flies by their proboscides, and to hold them tight until the insects die. Then the hold is released and the dead creatures fall to the ground.

### PLANTS THAT MAINTAIN ARMIES

Some plants go still further in protecting themselves. They provide little crystals of sugar on the exterior of the flower, of which certain species of warlike ants are very fond. This enables the plant to maintain a garrison of defenders, and woe betide the beetles that would gnaw its nectar cups!

About three thousand species make such provision for the maintenance of standing armies. Some of the acacias go even further than this, actually providing sentry boxes in the shape of hollow thorns for their defenders. They also prepare, in addition to the sugar, little bodies of albuminous matter at the tips of the leaflets, which serve the ants as food.

© Ernest L. Crandall

BLUE WILD-INDIGO FLOWERS AT BLACK POND, VIRGINIA

The struggle of the flowers to keep their nectar safe from robbers who do not serve them is as unrelenting as the battle between the locksmiths and burglars of human society.

Orange-growers in China and fruit-growers in Italy make use of this relationship between ant and plant by establishing ant hills at the bases of their trees, thereby accomplishing the results we achieve by spraying.

Cross-fertilization by insects has been said to produce a sort of floral aristocracy, with larger blossoms, brighter hues, sweeter scents, and richer nectar. Usually the guests come and go at will, but not always. Sometimes they are actually kidnapped and held prisoners until they have rendered their service—for a flower's invitation always has the string of obligation tied to it.

One of the birthworts, for instance, has hairs in the corolla which permit the ant or other creature to enter, but hold it prisoner until it has crawled all over the stamens and pistils, and is either loaded with pollen by the one, or has had its burden taken from it by the other. Sometimes the imprisonment lasts for as long as sixty hours.

The Dutchmans-pipe accomplishes the same object by making the tube leading

© Ernest L. Crandall

A VERMONT BULLFROG COMES OUT TO OBSERVE AN ARROWHEAD

to the nectar so smooth that the small flies entering it cannot get a foothold on the way out, until the flower withers.

Some of the orchids secrete a copious supply of nectar, which is poured into a little chamber that has an overflow spout to discharge the surplus. The bees visit the flower to gnaw the sweet, fleshy ridge within. In doing so, they frequently push their fellows into the nectar chamber, where they get involuntary baths and from which they can escape only through the overflow spout. This forces them to rub their bodies against the receptive stigmas, and thus leave with the latter pollen from a previously visited flower.

### THE YUCCA AND ITS MOTH

The yucca moth and the yucca flower have formed a striking flower-insect partnership. When night comes, the female moth will be found busily engaged in visiting yucca blossoms and scraping the anthers bare of their pollen.

This she makes into a ball. When enough flowers have been visited to make the ball two or three times the size of her own head, she flies away to another blossom whose pistil has reached the receptive stage.

There, with her ovipositor, she makes an incision in the pistil, puts her egg into the cut, and then runs to the top of the stigma and rams the pollen into its funnel, which insures the setting of seed.

The mountain-laurel fastens each of its stamens down in a corresponding pocket of the corolla. When a bee visits the flower and treads around over the corolla in its task of draining the nectar cup, it steps on the stamens one by one. This releases them after the manner of a mouse springing a trigger trap, whereupon the stamen springs up and over the back of the bee, dusting it with the pollen in the anther.

Some flowers, like the milkweed, grip the legs of insect visitors and hold them fast. In trying to "yank" the trapped leg free, the bee pulls loose a little saddlebag arrangement, containing two packs of pollen, which adheres to the leg. Flying away to another flower that has a receptive stigma the insect leaves the saddlebags with it.

Not all flowers, however, attract their

Photograph by Mile High Photo Company

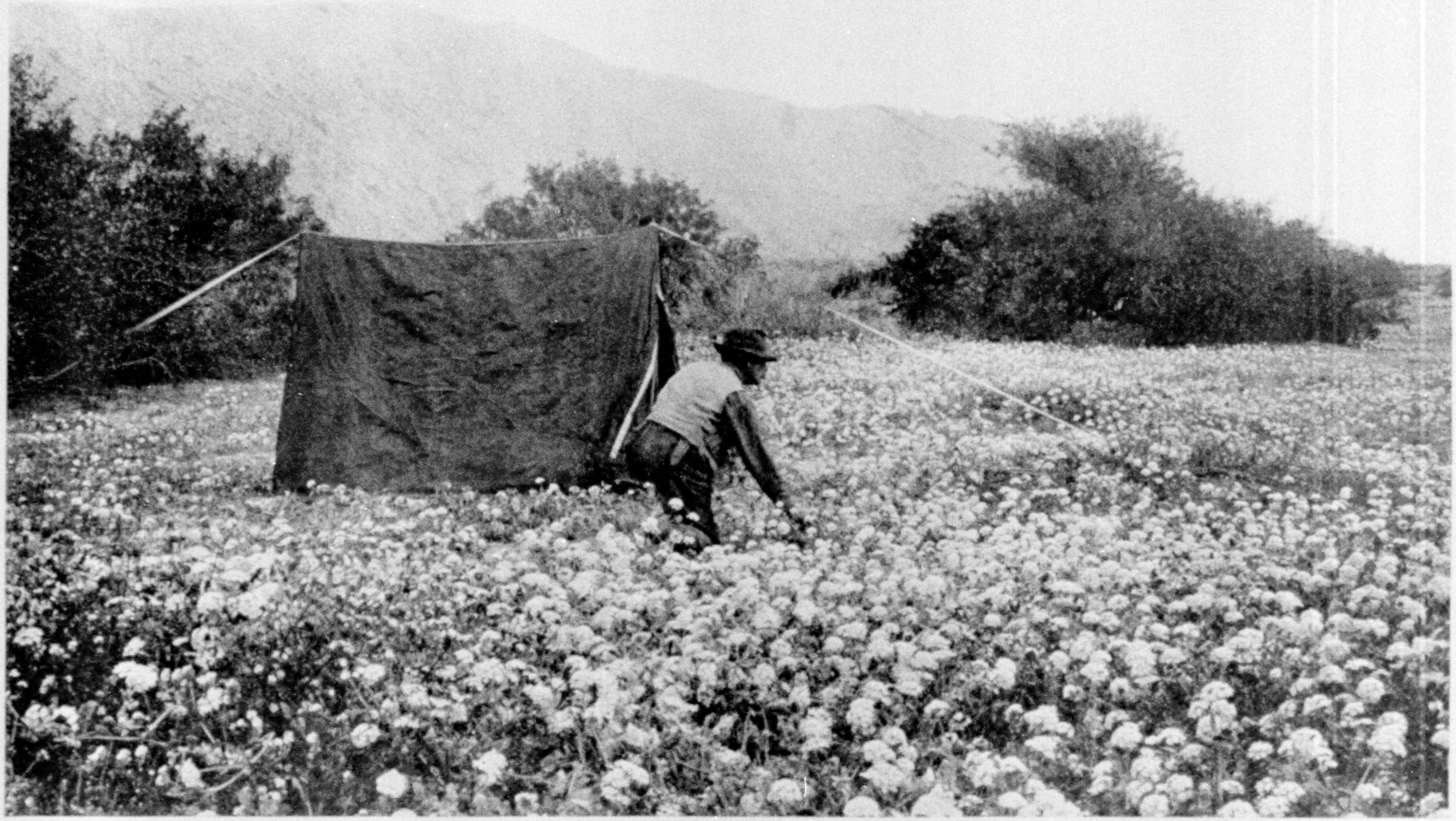
PONDLILY PADS ON SNOW WATERS, WILD BASIN, ROCKY MOUNTAIN NATIONAL PARK

Ganong, in his excellent book, "The Living Plant," reminds us that, in the dispersal of their seeds, plants employ methods analogous to man's ways of supplementing his legs. They build rafts that match his boats, employ animals as he rides horses, devise lighter-than-air craft and heavier-than-air gliders, use birds as airplanes, and even steal rides on his ships, his railroad trains, and his automobiles.

guests by fragrance and beauty. Some of them claim the attentions of the flesh flies, for instance, and affect a resemblance to decaying flesh, both in color and odor. The carrionflower and the skunk-cabbage are examples of this departure from the orthodox.

The arrangements by which flowers having both stamens and pistils prevent self-fertilization are of various types. Some, like the meadow cranesbill (*Geranium pratense*), mature their stamens first. The stigma does not develop to a receptive condition until after the stamens have discharged their pollen.

Others, like the introduced birthwort (*Aristolochia clematitis*), solve the problem the other way around, maturing their stigmas first and holding back their stamens until after the stigmas have passed



Photograph by J. Smeaton Chase

WHERE THE SANDVERBENA AND THE MESQUITE MEET IN CALIFORNIA

Many desert plants have learned to "make hay while the sun shines" by gorging themselves with water on the few occasions when rain falls and then guarding it, as a miser hoards his gold, while they fight their battles with scorching heat.

the receptive stage. There are other devices employed to accomplish the same end, each remarkable in its effectiveness.

### COLONIZING METHODS EMPLOYED

That plants must send out colonies, though themselves rooted to one spot, is plain to all who give the matter a moment's thought. If they did not, they would finally reach a point of density and competition where few, if indeed any, could survive. Furthermore, the soil in many cases would become so exhausted that they would starve.

Still further, conditions are ever changing, and new and more favorable locations are ever developing.

Some plants colonize by powers of independent locomotion. For instance, the slime-molds—those unorganized masses of living protoplasm found in decaying wood, wet earth, or neglected flowerpot—creep along in a given direction precisely as does the amœba among animals. Some algæ develop spores possessing tiny hairs which vibrate and propel them through the water. Others have little flagellums that act like tractor propellers on an airplane in drawing them through the water.

Colonization through extension of growth is a frequent method employed by higher plants. The strawberry with its runners; the yarrow and the apple tree with their suckers; the mushrooms with their mycelial threads and fairy rings; the briers with their stolons, and the walking ferns with their fronds rooting at the tips, are examples of this method of colonization. So is the Solomonseal which grows underground year after year, the old parts dying as new ones are formed.

Of course, plants that send out runners cannot travel fast or far, and other means of colonization are demanded by those which seek to go great distances.

Seed expulsion is one of the improved methods of spreading a plant's domain. In the vetches the pods burst open, the two halves of the pod twisting in opposite directions. In the wild geranium the ripening styles suddenly curl up and burst open the seed box.

In the castor-bean, the witch-hazel, and the acanthus the valves of the capsules burst, shooting out the seeds. In the violet the slick seeds are caught between the two sides of the ripening pod, which squeeze harder and harder until the seeds are shot away, exactly as a boy shoots a bean by pressing it between his finger and thumb.

But all the mechanical arrangements by which plants and flowers send out colonies without outside help would come far short of the needs of the situation. They must enlist the aid of outside agencies, such as the birds, animals, and even man, to reach the far-flung positions so many of them aspire to possess.

One method by which they are able to command this service is by developing seeds with hooks, which cling to hair or feather or clothing. The seeds of the close-clinging burdock, the cocklebur, the beggar-tick, and the Spanish-needle are familiar examples.

Hooks are less efficient in holding on to feathers than glues, and, as might be expected, there are many plants that develop sticky seeds to insure transportation by the fowls of the air. Birds in this way often carry seeds hundreds of miles. The mistletoe berry and the twinflower are examples of plants providing their seeds and fruit with adhesive material so that they can use the birds as animated airplanes.

Other plants bring about the transportation of their seeds by animals either by developing seeds in edible fruits or edible kernels in hard shells. The peach and the blackberry are types of the former, and the hickory nut of the latter. Neither kind is attractive as food until the seed is mature.

### ATTEMPTS TO DECEIVE

Some seeds seem actually designed to deceive animals and to procure their dispersal by fraud. Cow-wheat, for instance, produces seeds so closely resembling ants' eggs that many of them are found in ant hills. One plant produces a seed pod resembling a caterpillar relished by birds; another, a seed resembling a beetle.

Some of the castor-bean plants produce seeds resembling fat ticks. In all such cases it is soft-billed birds the plants seem to impose upon. Their seeds wouldn't have a chance of safely passing through the gizzards of the grain eaters.

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A DAYLILY ENTERTAINING A BUTTERFLY GUEST

Most of the weeds of America are of Asiatic and European origin. They have come as stowaways, and, after landing on our shores, have spread with tremendous rapidity. They have relied on man for their dispersal and have not been disappointed.

Water dispersal of seeds has been employed by many plants. The Hindu lotus, some of the waterlilies, and the coconut palm are examples of waterborne seeds. No matter what the geological history of the vast number of islets in tropical seas, their shores are fringed with coconut palms. With their great air-filled husks, the coconuts travel up and down the seven seas for months and years until they find a beach where they can get a "root hold."

Wind-dispersed plants are numerous. We see them resorting to all kinds of stratagems to command waftage by the winds. The parachute plume of the dandelion, the down of the thistle, the silky plume of the Virgins-bower, the soft tuft of the milkweed, are examples of the effective vehicles which carry seeds far and wide on the wings of the wind. The propeller-blade seed of the maple is another typical device utilized for seed dispersal.

Still other plants gain the aid of the wind by folding themselves up into balls and waiting for gusts to come along, uproot them and drive them to new habitations, scattering their seeds as they go. The Russian thistle and the rose-of-Jericho are characteristic "tumble weeds."

In Russia there is a plant known as the "wind witch," which has a root like a radish. When it matures the branches of the stalk curl down and pull up the plant, root and all. Then it waits for a high wind to rise and blow it away to some new location where it can take root again and begin a new career.

### EACH PLANT BUILDS ITS OWN CELL CITY

The ways by which individual plants build their houses and do their work form a story no less fascinating than the methods by which the flowers hand their lives on to future generations, though they themselves are destined to perish.

The seed that finds its "place in the sun" settles down and awaits the hour when propitious conditions of moisture and warmth shall awaken the germ of life that sleeps within.

Once this little speck of living matter is aroused in its tiny cell it becomes busy, sending out bits of itself to the neighborhood around it. Each of these promptly builds itself a tiny house of its own, with walls a thousand times thinner than the finest gossamer, but still constructed of microscopic bricks of cellulose, between the interstices of which the pioneering protoplasm can maintain connection with the parent cell, and at the same time reach out and start its own children to building other cells.

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A SPIDER WEB AMID COSMOS STALKS

The spiders often spread their webs in the paths of the guests going to the flowers' banquets.

The size of these cells varies. A single cubic inch of fine cork may have as many of them as there are people in the world, yet each one has been built and inhabited by a protoplast, which has not only patiently thickened the wall of its house, layer by layer, but has also done its bit in the life of the community of which it is a part.

When the microscope was first invented and philosophers peered into these little houses and saw the inchoate plasm within, amazement and awe possessed them. Jan Swammerdam, the great Dutch student, became almost insane at the marvels his lens revealed, and finally destroyed his notes, holding it a sacrilege to unveil and thereby profane the wonders hitherto beyond human ken.

The things the pioneers saw were considered delusions, until the members of the Royal Society of London peered through a microscope and jointly signed a paper saying they had seen these wonders with their own eyes.

### THE "SILENT ROAR" OF THE VAST PLANT INDUSTRY

A somewhat viscid substance, not unlike the white of an egg, though thicker, the bit of protoplasm within a cell does the fundamental work of all organic matter.

Huxley, in speaking of the stirring activities of the busy little protoplasts, or individual bits of protoplasm that build their several cells and do their respective community tasks in a plant's activities, says: "The wonderful noonday silence of a tropical forest is, after all, due only

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Photograph by Harry F. Blanchard

A YOUTHFUL GARDENER WATERING HIS PLANT CHILDREN

Water, water, water, and more water, is the demand of growing vegetation. Ground that gets less than 2,500 tons to the acre is semi-arid. Six thousand tons is about the normal annual rainfall per acre in the United States.

to the dullness of our hearing; and could our ears catch the murmur of these tiny maelstroms, as they whirl in the innumerable myriads of living cells which constitute each tree, we should be stunned, as with the roar of a big city."

And whoever has seen the radio receiving set catch the infinitely small impulses of electricity and amplify them into sounds that fill a loud speaker can appreciate his statement.

As it grows, the little community of protoplasts that build a plant divides its labors, and the complex activities of the growing flower begin.

The whole community of cells constitutes the plant, and through the delicate interstices of their walls the inhabitant of each communicates with those of all the other cells, so that the living substance of the entire structure is in constant contact and forms one united mass.

The building of their own tiny houses by the individual protoplasts is an immeasurable boon to humanity. Without these our plants and trees would never exist and all we would know would be masses of slime.

### SIGHT-SEEING IN A DAISY

Let us reduce ourselves to the size of a molecule of water and ramble through one of these cell cities we call a daisy, noting the hustle and bustle and industry constantly taking place.

We promptly discover that one of the principal things going on is the manufacture, by the protoplasts, of a myriad tiny green grains which have been named chlorophyll. These grains have the power to screen out all the rays of light except the red and most of the blue, indigo, and violet series, which they use in their work.

Concentrating these useful rays on the stream of minute particles of carbon dioxide which come into the leaves through their pores or stomata, the chlorophyll breaks the carbon and oxygen apart and unites the carbon with water, which thereupon becomes grape sugar.

In man's laboratories it takes a temperature of 1,300° C., enough to turn the hardest steel into liquid, to separate the carbon and oxygen atoms of the carbon dioxide molecules exhaled by animals and absorbed by plants. But the little laboratories of the cell city do it without difficulty, and in so doing fabricate the basic food of all organic life, grape sugar.

To make a pound of the sugar, our guide tells us, the plant must work over nearly ninety gallons of carbon dioxide, in the extraction of which it has had to filter thousands of gallons of air. The sugar factory works from sunup to sundown, the eight-hour day being unknown there. But it operates only when the leaves are out.

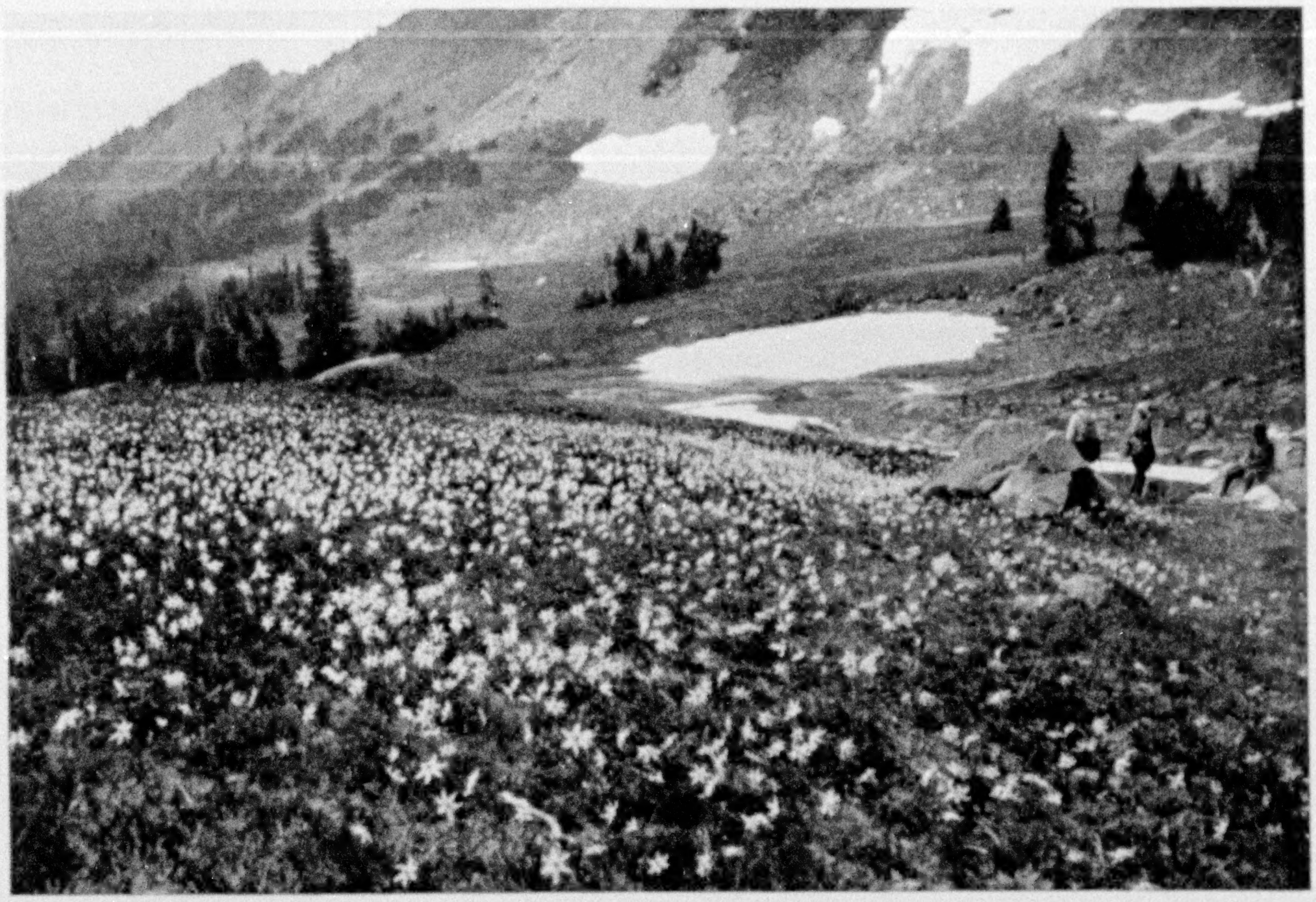
### A LEAF AS A FACTORY

How closely the sugar industry in the plant parallels the activities in a human factory is shown by the fact that the leaf corresponds to a building, the cells to the several rooms therein, the blue and red sunlight rays to the power employed, the chlorophyll to the machinery used, carbon dioxide and water to the raw material utilized, grape sugar to the manufactured product, and oxygen to the by-product.

As we move along we see a constant stream of carbon-dioxide particles rushing by, passing through the cell walls, where they meet the molecules of water. The chlorophyll grains turn their burning glasses with their red and blue rays upon the materials thus gathered into the retort, and grape sugar is formed.

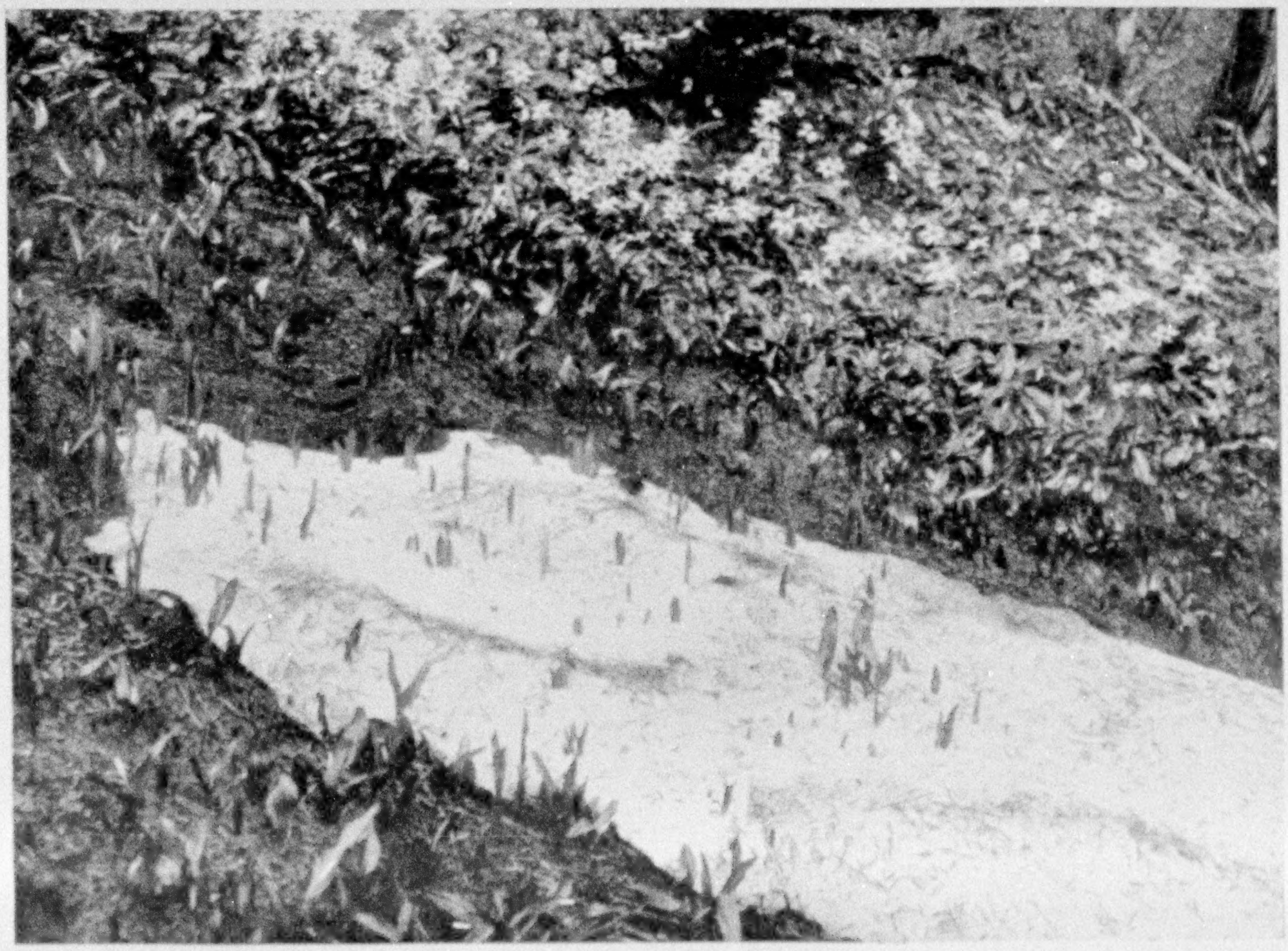
After the chlorophyll grains have made the grape sugar, some new workers take it and transform it into starch, which is stored in cells for future use, just as the iron manufacturer converts his molten metal into pig iron, stores it, and melts it again when he wants to use it. A thousand square feet of leaf surface will manufacture one pound of starch in five hours of sunlight.

The action of plants in storing up starch closely parallels that of business men in accumulating estates. Just as the business man invests his funds so that they will be available for conversion into ready money if he needs it, so the plant puts by its earnings in the form of starch ready for reconversion into the coin of its realm, sugar, if necessary. And just as the business man bequeaths his estate to his children when he dies, so the plant transmits its surplus to its posterity when it passes.



AVALANCHE-LILIES IN SPRAY PARK: MOUNT RAINIER, WASHINGTON

The flowers follow the retreating snows in lofty mountains and high latitudes with a promptness that makes them appear to be armies pursuing an enemy.



Photograph by Curtis and Miller

FLOWERS THAT WILL NOT WAIT FOR THE SNOWBANK TO DISAPPEAR: MOUNT RAINIER NATIONAL PARK, WASHINGTON

Men and animals have learned to rob the plant of its savings and its children of their patrimony by eating things rich in starch.

A third material is made by the plant which is used in its building operations—inulin. It closely resembles starch, and is fabricated by another set of workers.

While all these manufacturing activities are going on in the cell city we call a daisy, sap must also be provided, for without rich supplies of moisture and a tiny bit of mineral substance the wheels of industry of the community cannot revolve.

So the roots act as pumps and bring into the city vast supplies of water with mineral in solution, in the proportion of a grain of minerals to a gill of water. This sap is pumped to every part of the plant and bathes the protoplasm of every cell, keeping the protoplasts moist and in high spirits.

### THE RÔLE OF CELLULOSE

Out of the sugar, starch, and inulin fabricated by the three types of workers we have visited, other products are built, such as cellulose, which forms the microscopic bricks out of which the cell walls are constructed, and the fixed or fatty oils which are stored up in seeds, bulbs, etc., as reserve material for future exigencies.

As our guide leads us on through our daisy we see the cellulose being fabricated. The fibers of cotton, the pith of woody stems, and the filter paper of the chemist are familiar forms of cellulose.

The plant makes it serve a double purpose, now as cell-wall material, and now as a stored product that may be reconverted into sugar if needed for food.

As the cell ages, lignin may be added to give stiffness to the plant structure, making wood; other materials are employed to give hardness to the shells of nuts, waterproof character to cork, or gumminess to seeds like flax.

It is the cellulose of plants which lived long eras ago that we burn when we use coal to-day. Nature bottles up sunshine in it, so that every engine driven by coal is indirectly a solar engine, and every bit of warmth our fires afford in winter is the heat of summers millions of years past.

If we visited other plants and entered into their cell communities we would see them manufacturing the malic acid of apples and currants, the citric acid of lemons and oranges, the tartaric acid of grapes; the waxes which make some flowers, like the nasturtium, immune from wetting; the resins which salve the wounds of injured plants; the glucosides which make the wonderful hues of autumn, and the poisons which protect the plants and serve humanity, such as strychnine and morphine. Still other workers are building up the proteins or flesh formers.

But most interesting of all the products made by the plant, perhaps, are the enzymes. They convert sugar into starch and starch into sugar. They have been called the tools with which the protoplasm effects the chemical results it requires. Dr. Frederick V. Coville, the eminent botanist of the United States Department of Agriculture, has shown that it is the chilling processes of winter, and not the warm sunshine of spring alone, that cause the buds on the northern trees to open. He has described how they are driven out by the terrific forces released when the enzymes penetrate the walls of the starch cells and convert the starch into sugar.*

### PUMPING UP A WATER SUPPLY

An examination of the machinery by which plants take in the raw materials out of which they fabricate so many marvelous substances reveals many interesting mechanisms.

Inspecting the seedling of a mustard, one finds that it has a slender root covered with a multitude of tiny hairs. At the end of the root is a growing tip.

If a potted plant is cut down to the surface of the soil and a glass tube slipped over the stump, it will be noted that the sap which would have flowed through the plant rises up in the tube to the approximate height of the original plant.

This sap consists of water and mineral matter drawn out of the earth by that strange process of Nature through which

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* See "The Wild Blueberry Tamed," in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1916.

XUM

Photograph by Ernest L. Crandall

MOUNTAIN-LAUREL GRACING THE BANKS OF A MARYLAND STREAM

the weaker of two solutions passes through a membrane separating them into the stronger.

The protoplasm acts as a membrane, and the water in the soil is drawn through it to join the sap in the root. As the volume increases the osmotic force drives the excess up into the plant structure.

The hairs of plant-roots are ever busy pumping in water. Through capillary attraction in the soil, particles several feet away are made to contribute their moisture to the hairs. A cubic foot of clay may have as much as three acres of particle surface exposed to the moisture drafts of a root system.

Between the water the plant uses in the manufacture of grape sugar and the much larger quantity it must pass through its system to keep the plants from wilting, heavy drafts are levied on the soil.

An oak tree with 700,000 leaves is estimated to give off 120 tons of water a season; an acre of grass has been found to give off more than six tons in a single day. From 200 to 500 pounds of water are given off by plants for every pound of dry substance manufactured.

### SUCTION AND FORCE PUMPS

It has been estimated that if the rainfall during the month of July, in the corn belt of the Mississippi Valley, is one-half inch short of the three inches required to make a full crop, that half-inch shortage costs the farmer five dollars for every one of the millions of acres of corn grown in that belt.

The osmotic power in the plant is supplemented by other agencies to carry the water to the top of the tree. As a big tree must do the equivalent of carrying 500 bucketfuls of water up a ten-foot flight of stairs every ten hours in midsummer, one may judge how important the process is.

The chemical processes going on in the interior of a plant in the growing season develop considerable heat, just as the friction in an automobile motor makes it hot. To carry off the heat engendered in his engine by friction, the motorist employs a cooling system, with water caused to circulate in a radiator system.

The plant needs even more effective

cooling to keep down the heat of chemical change. The major portion of the water it demands is employed to keep its "radiator" full in order that evaporation on the leaf surface may reduce the plant's temperature.

Many plants have damper systems, whereby excessive radiation is checked, a method corresponding to our employment of hood covers and winter fronts on our automobile engines.

The mineral matter drawn into plants in solution is made available in many ways. The earthworms are allies of plant growth. It has been estimated that an acre of arable land contains an earthworm population of 130,000, and that they pass two tons of soil through their gizzards every season, converting it into humus rich in soluble minerals.

Lichens will eat into marble like acids in getting mineral material for their upbuilding. Different kinds of plants need different minerals—potatoes and turnips call for plenty of potash, wheat and corn for much silica, beans and clover for considerable quantities of lime.

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A SONG SPARROW BUILDS HER NEST IN A MARYLAND ROSEBUSH

### PLANTS ADAPT THEMSELVES TO SURROUNDINGS

The manner in which all kinds of plants adapt themselves and their parts to their environment has long been a source of wonder to those who know the flowers best.

The leaves, whether on tree or flower or grass, always arrange themselves to command the required amount of light. Some flowers close at night and have been known to do so upon the approach of a shadow. Others will close if a red-hot poker be brought near to them. Odors offensive to them cause some flowers to close and even to die.

Insectivorous plants are largely an adaptation to environment. Usually those which prey upon insects grow in regions where nitrogen is scarce—mayhap in bogs and perchance in sandy, acid soil.

The traps of these plants are strikingly well suited for their work. The Venus flytrap's leaves stand open normally. An insect crawls in, and in so doing touches one of the three trigger hairs that project from the surface of each half of the leaf.

If the insect is worth while, the leaf shuts up tight and does not open again

Photograph by Ernest L. Crandall

OX-EYE DAISIES GROWING WITHIN THE SHADOW OF A SOUTHERN RED OAK AT ARLINGTON, VIRGINIA

The action of plants in storing up starch closely parallels that of business men in accumulating estates. The potato is mainly a savings account of starch, put aside by the plant for the benefit of its heirs.

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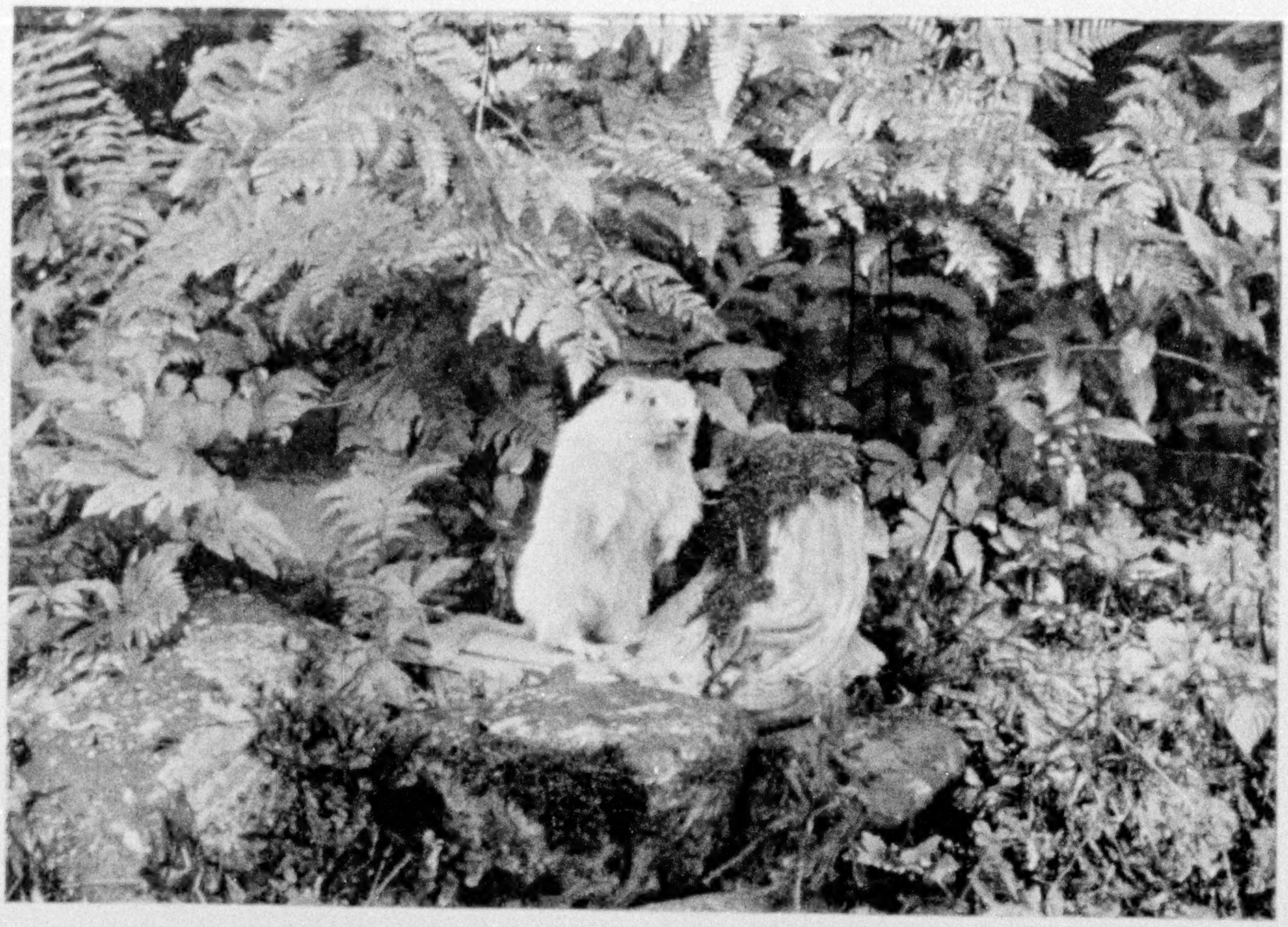
A WASHINGTON WATERLILY GARDEN, WITH SWEET-SCENTED WHITE WATERLILIES IN THE FOREGROUND

The flowers build up proteins or flesh-formers, and some of them use as many as 15,000 atoms of carbon, hydrogen, oxygen, nitrogen, sulphur, and phosphorus in making a single molecule, which becomes a far more complex thing than an automobile or a watch. No wonder man has not been able to progress far forward in making synthetic plant products!



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AN ALBINO WOODCHUCK AMONG FERNS ON THE FARM ADJOINING PRESIDENT COOLIDGE'S FORMER HOME AT PLYMOUTH, VERMONT

until the flesh of the prisoner has been digested. But if it is such a small creature as a gnat or a tiny ant, the trap opens and lets the prisoner fall to the ground.

Once a sizable insect is caught, there is no escape for it. The more the insect struggles the tighter the trap closes. On the other hand, give the trap a stone and it soon releases its hold.

In setting its snare the flytrap is not content to wait for chance prey; it actually spreads bait for them, in the shape of a sweet secretion on the surface of the leaves. It is little wonder that Darwin called this "the most wonderful plant in the world."

The competition of plants is often a fierce race for the survival of the fittest. We see the climbing plants creeping up the trunks of giant trees, stealing the sun away from the latter's leaves, and often smothering or choking them completely. Many a fine tree has been killed by ivy plants robbing it of light.

There are many parasitic plants like the mistletoe, the dodder, and the broomrape, which have suckers that penetrate the bark of other plants and suck away their sap as leeches drink the blood of animals.

One often sees hazel and other stems looking like huge corkscrews; the deep spiral grooves have been caused by twining vines gripping the stem and preventing expansion along the spiral lines.

There is a group of plants known as Ficus, to which the fig belongs, whose seeds are deposited on the branches of trees by birds. Here they germinate. The roots clamber down until they reach the soil and the stems climb up until they reach the crown of the tree. Once thus established, the hitherto soft and tender aërial roots begin to harden and to throw out branches which flow into, and amalgamate with one another, until the tree trunk is girt about with a series of irregular living hoops. Ultimately the tree is killed by these strangler figs.

### PLANTS ARMED FOR THE FRAY

But while competition is often fierce and the struggle for survival frequently bitter, many plants enter the conflict

Photograph by Ernest L. Crandall

A WATERLILY IS ALWAYS A THING OF BEAUTY

armed and ready to protect themselves against both plant and animal foes.

The latex of the rubbertree is not made to furnish man with automobile tires and raincoats, but rather to dress its own wounds. Does a woodpecker drill a hole in the rubbertree's trunk, the latex flows, and heals the wound. Does the beetle try to invade the cell city that constitutes the tree, it is made prisoner and duly executed. Does a mistletoe seed attempt to take root, the poisoned sap overpowers it.

As a protection against field mice, insect larvæ and other underground dwellers, many food-storing roots develop poisonous and disagreeable substances in their tissues. Sometimes these take the form of alkaloids and fetid gum resins. The soapwort, the rhubarb, the monkshood, and some of the gentians use this method of defense.

The close approach of some of the flowers to what men conceive to be intelligence has been noted by many authorities. One of them pinned a live fly on a bit of cardboard half an inch from the leaf of a sundew. In two hours the leaf succeeded in approaching the insect and fastened its tentacles about the creature.

The evolution of plants and the development of cell communities form one of the most fascinating stories in Nature. Originally they were undoubtedly one-celled structures, some of which still survive in our times. All the varied functions of a plant thus had to be performed by a single cell.

Then, coming out of the water and upon the earth, they needed to be rooted to the spot from which their nourishment would come, and roots began to develop.

Step by step, life requirements became more complex and new conditions were met by the creation of specialized cells which could do a definite task, and the plant was gradually transformed into the complex creation that it is, largely along lines paralleling the development of peoples from simple families to highly organized communities.

We encounter plants in all stages of this rise from the one-celled primitive to the intricate modern, to-day. When they first appear, the leaf bud and the flower bud are indistinguishable. In the white waterlily the gradual stages of the transformation from the green sepals of the calyx to the yellow pollen-producing stamens may be studied, showing that the processes of evolution have gone on.

Jean Henri Fabre's account of the evolution of the cabbage is a classic picture of what the plant breeder's art—which is only an intensification of the slow and patient methods of Nature—may accomplish in the evolution of plants.

### OTHER WONDERS AWAIT YOU

One might go on indefinitely, rambling through the plant world and discovering new thoughts that thrill at every turn. The bacteria, the molds, the yeasts—each of the thousand and one groups which represent departures from the original household has a story to tell.

But this is an introduction to the marvels of plant life, and not a treatise on plants. In the biographies of the individual plants in the accompanying flower series, many additional fascinating facts are brought out.

In their natural colors the flowers can tell their own stories of structure better than any words could, so that the descriptive text is left free to tell the story of their life problems, and the fine ingenuity with which they solve them.

## GROUND-IVY

**Glecoma hederacea** L. Mint Family [Plate I, left]

This little immigrant from Europe has shown itself to be a great colonizer, and has established itself as far north as Newfoundland and Ontario, as far west as Oregon, and as far south as Georgia. It has a vast array of vernacular names, among them, alehoof, cat's-foot, gill, gill-ale, gill-over-the-ground, gill-go-by-the-ground, hayhofe, haymaids, tunhoof, creeping Charlie, robin-run-away, crow victuals, etc.

Its "gill" names are a survival of its European antecedents. There, its leaves were long used in the processes of fermenting and clarifying beer. The name is said to originate from the old French word *guiller*—to ferment or make merry.

The ground-ivy's preferred habitat is shady waste places, and its flowering season runs from early March to June. Grazing stock dislike its taste.

Among the cousins of the ground-ivy are the bugleweeds, the woodsages, the pennyroyals, the balms, the skullcaps, the hoarhounds, the dragonheads, the hyssops, the selfheals, the wildbergamots, the sages, the hedge-hemps, deadnettles, the peppermints and spearmints. The foliage of most of the members of this family is dotted with small glands containing volatile oils, upon which depend the aromas of the various species.

## PITCHERPLANT

**Sarracenia purpurea** L. Pitcherplant Family [Plate I, middle]

Flourishing in peat bogs from Labrador to Florida and westward to the Rocky Mountains, the pitcherplant has the range of vernacular names characteristic of those flowers which invade widely distributed communities. Huntsman's-cup and whippoorwill's-boots are among its local aliases. Adam's-pitcher, fever-cup, small-pox plant, fly trap, and side-saddle flower are other names it sometimes wears.

The flowering season of the pitcherplant occurs in May and June. The blossom is striking. Its petals are of a deep, reddish purple, sometimes partly greenish or pink, and the style possesses an umbrella-shaped yellowish dilation.

The leaves at the base are hollow and cuplike, reddish and green outside, and pale-green, streaked with crimson inside. They are broadly winged and hooded, and become partly filled with water. Insects flock there to quench their thirst, or are attracted by the raw-meat appearance and decaying odor. The footing is very insecure, however, and many of them terminate their adventure by slipping helplessly into the water and drowning. In order to prevent the victims from escaping, the leaves are provided with a bristly surface, the hairs of which point to the bottom of the cup, and thus prevent the prisoners' exit.

The insects caught in the pitcherplant's ingenious trap, finding escape impossible, soon give up the struggle and die. The plant seems to have more need of nitrogen compounds than most flowers, and these it draws from the decaying bodies of the imprisoned insects. Several hundred species of carnivorous plants have been found in the world.

## PALE WILDBERGAMOT

**Monarda mollis** L. Mint Family [Plate I, right]

The pale wildbergamot is one of those flowers that has found hospitable environment in many places, having reached British Columbia in Canada and Texas in the United States. Its favorite habitat is in dry soil areas. The magenta shade of its blossom makes it a favorite with the butterflies; the ruby-throated hummingbird is also a visitor.

The bergamot mints are useful in the manufacture of perfumery, the essential oil being highly aromatic. The pale wildbergamot has

Photograph by Mile High Photo Company

A TRYSTING PLACE IN LOVER'S LANE: ROCKY MOUNTAIN NATIONAL PARK

In the manufacture of a pound of solid matter, a tree or a plant must evaporate from 200 to 500 pounds of water to carry off the heat generated by the chemical reactions required in the process (see text, pages 599 and 601).

Photograph by J. Horace McFarland Co.

MERTENSIA, OR VIRGINIA BLUEBELLS, CARPETING A WOODLAND

Some of the smallest plants known are so minute that they make the typhoid and tetanus bacilli, which are invisible to the naked eye, seem large in comparison. One of these ultramicroscopic plants would find more room in a drop of water than would a fish in New York harbor.

many more or less distant cousins, among the closest being the beebalms. Spearmint, peppermint, mountain-mint, and catnip are cousins a little further removed.

Some members of the mint family have been so thoroughly domesticated that they grow well under cultivation, though they levy such a heavy tax upon the land that a crop rotation is required, with only one crop of mint every five years. In reclaimed swamp land they are sometimes allowed to grow for five years without change. The mint is mown like clover and cured like hay. The oil is usually extracted by passing live steam through the mass of cured material; this steam carries the essential oil with it, and on being condensed, the oil and water separate, after which the mint crystals form in the oil.

## WILLOW AMSONIA

**Amsonia tabernaemontana** Walt. Dogbane Family [Plate II, left]

This representative of the dogbane family is a midsummer flower, with a range extending from New Jersey to Illinois and from Florida to Texas. Starting out as a hairy-leaved youngster, on reaching maturity its foliage becomes as smooth as ivory. It blossoms from April to July. The corolla tube is hairy inside.

Some of the other members of the family are the periwinkle, the climbing dogbanes, and the Indian-hemp. Most of the members of the family secrete an acrid, bitter juice.

The dogbanes are distantly related to some of the various plants yielding rubber. The Pernambuco or Mangabeira rubber of commerce, indeed, comes from a member of the dogbane family itself, a small drooping tree which yields an edible fruit known as "mangaba," for the sake of which it is cultivated in many Brazilian orchards.

Some species of dogbane produce a root bark which has emetic, diaphoretic, and tonic properties. Some species in the western part of the United States furnish a fine, strong, long, and easily separated fiber, which the aborigines use in their textile manufactures.

## COMMON CATTAIL

**Typha latifolia** L. Cattail Family [Plate II, middle]

Almost everyone is familiar with this cosmopolite of plantdom that has found America so much to its liking. It prefers the damp, moist richness of the swamp and goes wherever marshy conditions prevail, except in the high latitudes. The name tells two parts of its story—*typha*, meaning a bog, and *latifolia*, meaning broad-leaved. It grows from 4 to 8 feet high.

Like all widely distributed plants, it rejoices in a large number of aliases, such as great-reedmace, cat-o'-nine-tail, marsh beetle, marsh pestle, cattail flag, bull-segg, water-torch, and candlewick.

The old Italian masters frequently painted the cattail in the hand of the Master, as a mock scepter, in their pictures of the crowning of the Christ with thorns.

## PUSSY WILLOW

**Salix discolor** Muhl. Willow Family [Plate II, right]

Few American shrubs play a more charming part in our folklore than the dainty pussy willow with its downy catkins and greenish-brown bark. Inhabiting the damp borders of thickets or creeping down close to the water's edge along small streams, it awakens early to the call of spring, whether in Nova Scotia or Saskatchewan, Delaware or Missouri. Sometimes attaining a height of 12 feet, the pussy willow has a light, greenish-brown bark, usually tinged with red; but the smaller branches are of a deep reddish hue. The winter buds are purple. The catkins are usually well out before the leaves begin to appear. The shoots of the shrub develop roots in the water.

The willows are believed to be descended from some of the oldest flowering plants, in which the sexes were on different trees and the pollen was carried from the one to the other by the wind. To-day they are entomophilous plants, relying on the insects to be their messengers, and ready to pay them well for their services. Color and odor form the printer's ink with which the messengers are attracted by the male catkins, and pollen and nectar the coin of the messenger realm.

The bees are the busiest pollen purveyors for the pussy willow. The little Andrenid bees, a family whose members are only about half the size of hive bees, are its special visitors. They are well bearded, each hair being fitted with a row of barbs that cause pollen grains to adhere and be carried to the next flower.

The pussy willow has to serve another insect in a different fashion. A gallfly lays its eggs in its twigs and leaves, and in some way so stimulates the growing tissue that it develops a large series of overlapping scales, which are modified leaves. These, diverted from their normal purpose, are compelled to serve as a cradle for an enemy's offspring. They form conelike buds an inch or so long, and more than three-fourths of an inch in diameter. Cut one of these galls open at the proper season and you will find ensconced therein, "as snug as a bug in a rug," the sleeping larvæ of the gallfly.

## CARRIONFLOWER

**Smilax herbacea** L. Smilax Family [Plate III, left]

By some botanists the smilaxes are classed as a genus of the lily family. Others consider them entitled to rank as a family, and so classify them. Perhaps the lily family would be very glad if at least the black sheep that is the subject of this sketch were pruned from its family tree.

The carrionflower has a range that reaches from New Brunswick to Manitoba and from Florida to Nebraska. Its flowering season is from April to June and its preferred environment, woods and thickets. As its unsavory name is matched by a disgusting odor, the bees give it a wide berth and flies are called in to serve as its messengers. Attar of roses seems no more pleasing to the human odor-sense than the carrionflower to that of its fly friends. John Burroughs declared it smells like the vent of a charnelhouse, and Thoreau compared it to dead rats.

The carrionflower does not keep up its evil ways to the end of its time. Having made a virtue of necessity by fitting itself to entertain the little green flesh flies, as soon as it sets seed it throws off its evil nature, and, dressing up anew, in resplendent autumn tints, offers fine little bunches of small, bluish-black berries to the birds. Here again it has method in its madness, for these birds carry its seeds to other points and thus enable it to colonize in new localities.

## COMMON ST. JOHNSWORT

**Hypericum perforatum** L. St. Johnswort Family [Plate III, middle]

A cosmopolite, which came out of Asia with the races that marched westward and gave the star of empire its direction, the common St.-Johnswort has made Europe and America its own, except in the high latitudes where Jack Frost comes too early and stays too late for its well-being. Fields, waste lands, and roadsides are all to its liking in the matter of environment and it flowers from June to September, growing from one to two feet high.

The St.Johnswort is hard to extirpate. Its rank, rapid growth is highly exhausting to the soil, and this, of course, makes it a most undesirable alien.

Usually possessing sterile shoots about its base, the plant may be seen maturing seed capsules on some branches while there are petals of withered flowers, fresh flowers, and even buds on others. Under these conditions it is usually an unkempt, untidy-looking flower.

Secreting no nectar, the St.Johnswort appeals only to the pollen gatherers, and accomplishes cross-fertilization by that attraction alone.

Few flowers have gathered such a cluster of superstitions about them as this immigrant from Europe.

Gathered upon a Friday, in the hour when Jupiter comes to his operation, and hung upon the neck, it helps mightily to drive away all fantastical spirits, the peasants of Europe believe, and in accordance with that belief they hang it in the windows of their cottages on St. John's Eve to avert the "evil eye" and break the spells of the spirits of darkness. Girls believe that its leaves will decide whether or not the coming year will make them brides, and therefore if it flourishes when they plant it they consider its prosperity a happy augury for their future. In early times poets and physicians alike extolled its virtues, and an ointment made from it brought it the name "balm-of-the-warrior's-wound." It was also considered an efficacious remedy for melancholia.

Livestock learn to give the St.Johnswort a wide berth, as it is poisonous to them.

## SMALL SPATTERDOCK

**Nymphaea microphylla** Pers. Waterlily Family [Plate III, right]

Belonging to that princely family of aquatic flowers which includes the stately *Victoria regia*, the imposing *Castalia gigantea*, and the famous lotuses of Egypt and India, the small spatterdock is a humble American plant citizen quite content with its simple station. Flourishing from New Brunswick to Pennsylvania and westward to Minnesota, it flowers in midsummer, with ponds and sluggish streams as its favorite habitat.

The waterlilies of this and allied genera, numbering about 40 species, are, in the case of the northern species, perennials having rootstocks imbedded in the mud. So long as the water is deep enough to prevent its freezing solid, these rootstocks are able to spend the winter unharmed.

## AMERICAN BLADDERNUT

**Staphylea trifolia** L. Bladdernut Family [Plate IV, left]

The American bladdernut belongs to a family found in all parts of the Northern Hemisphere, but mainly in Asia. The species that is the subject of this sketch lives in moist woods and thickets from Quebec and Ontario to South Carolina and Kansas.

It is a shrub that grows to a height of 15 feet and blossoms in April and May. Its greenish-white flowers, arranged in nodding panicles, give the bladdernut its generic name, since they resemble the bunch of grapes called by the Greeks *staphyle*. Its specific name arises from the grouping of its leaves. Its common name was suggested by the inflated capsule and the hard-shelled seed inside.

In many communities the flower buds are used like capers in seasoning foods, and in some places the seeds are eaten. The European bladdernut, *S. pinnata*, is often imported by landscape gardeners and planted as an ornamental shrub.

## VIRGINIA SPRINGBEAUTY

**Claytonia virginica** L. Purslane Family [Plate IV, middle]

Flourishing in moist woods from Nova Scotia to Georgia and from Saskatchewan to Texas, the Virginia springbeauty, with a stem length of 6 to 12 inches, has flowers so delicate that they shrink at the slightest touch of the human hand, and yet so hardy that they can make their spring début along with the hepatica, arbutus, and bloodroot. Their early coming has been celebrated in some sections by naming them "Good-morning-spring."

The flowers of the springbeauty are starry blossoms which are turned mostly in one direction. They expand only in the sunshine.

This flower will not waste her sweetness on the desert air for insect pilferers, or blush unseen in the night or in bad weather; she shuts up shop when the sun-loving insects that are her customers seek their retreats at night or in dismal weather, and will not open again until they venture forth to her mart. Thus she saves her nectar and pollen for such as are welcome guests at her board.

Mining and leaf-cutting bees, bumblebees, and numerous species of butterflies are the principal guests, though 71 species of insects have been noticed as visitors. Among these were droves of hive bees, 31 species of two-winged flies, and even the little spotted ladybeetle with a taste for pollen.

The springbeauty has long since put behind her the time when self-fertilization was her method of perpetuating her species. She matures her stamens and offers their pollen to her guests before the stigmas have attained their maturity, which makes them susceptible to fertilization.

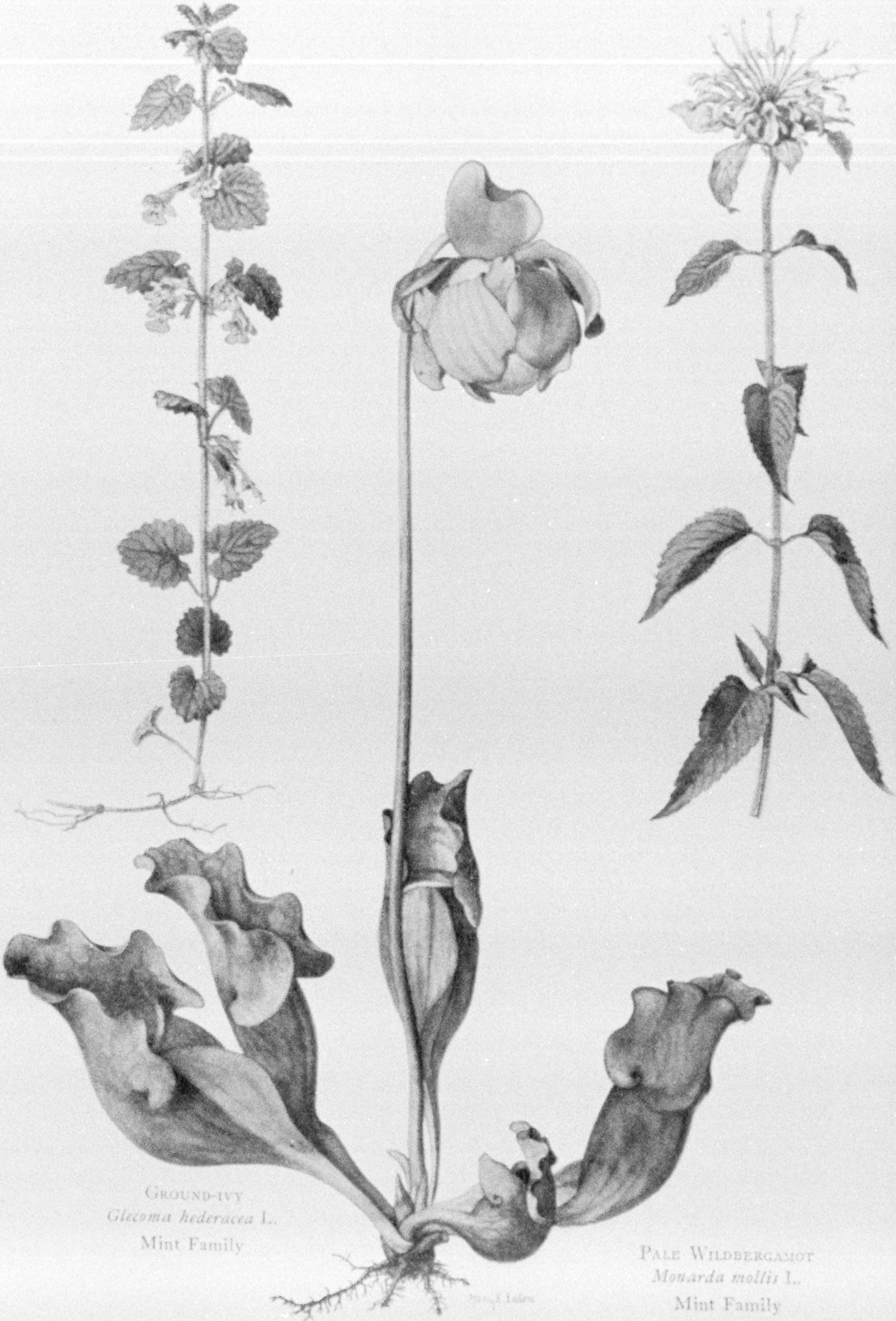
The proud portulaca and the humble "pussley" are cousins of the springbeauty and share with her the trait of pouting when the sun fails to shine on them.

## GOLDEN MEADOW-PARSNIP

**Zizia aurea** (L.) Koch. Parsley Family [Plate IV, right]

Blooming from April to June, in fields, meadows, and swamps, from New Brunswick to Saskatchewan, and from Florida to Texas, the golden meadow-parsnip is a member of one

XUM



GROUND-IVY
*Glecoma hederacea* L.
Mint Family

PALE WILDBERGAMOT
*Monarda mollis* L.
Mint Family

PITCHERPLANT
*Sarracenia purpurea* L.
Pitcherplant Family

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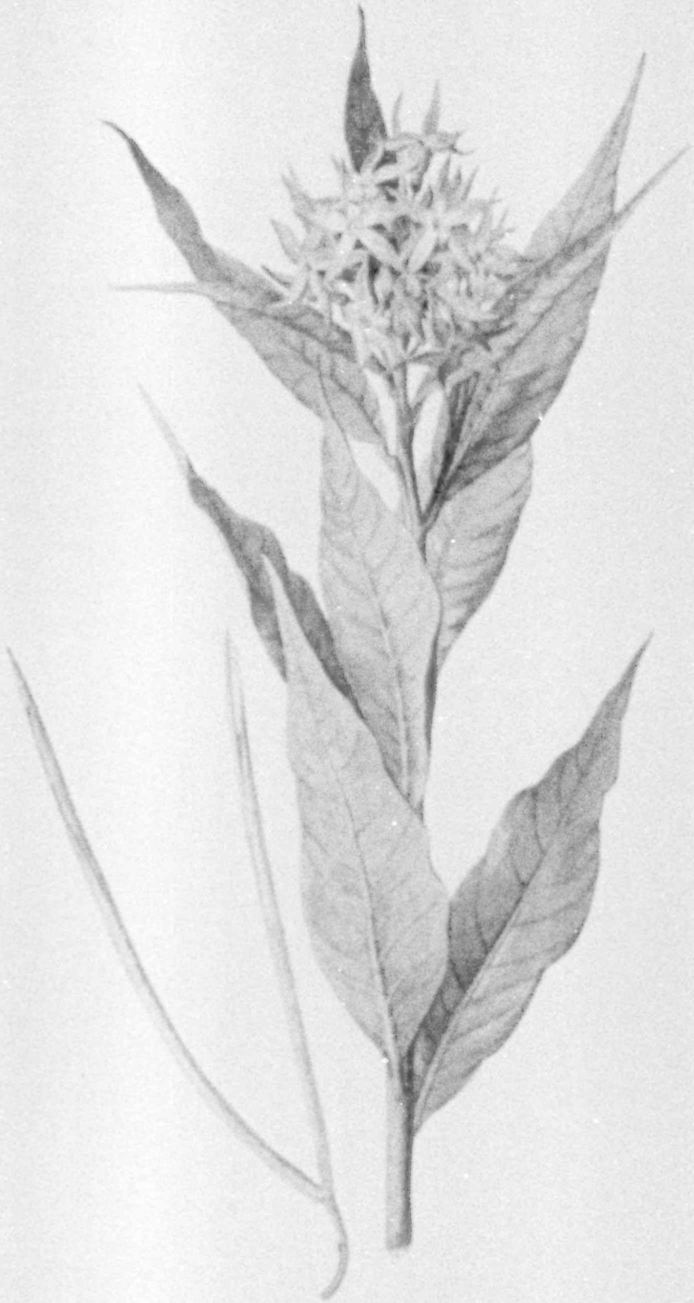
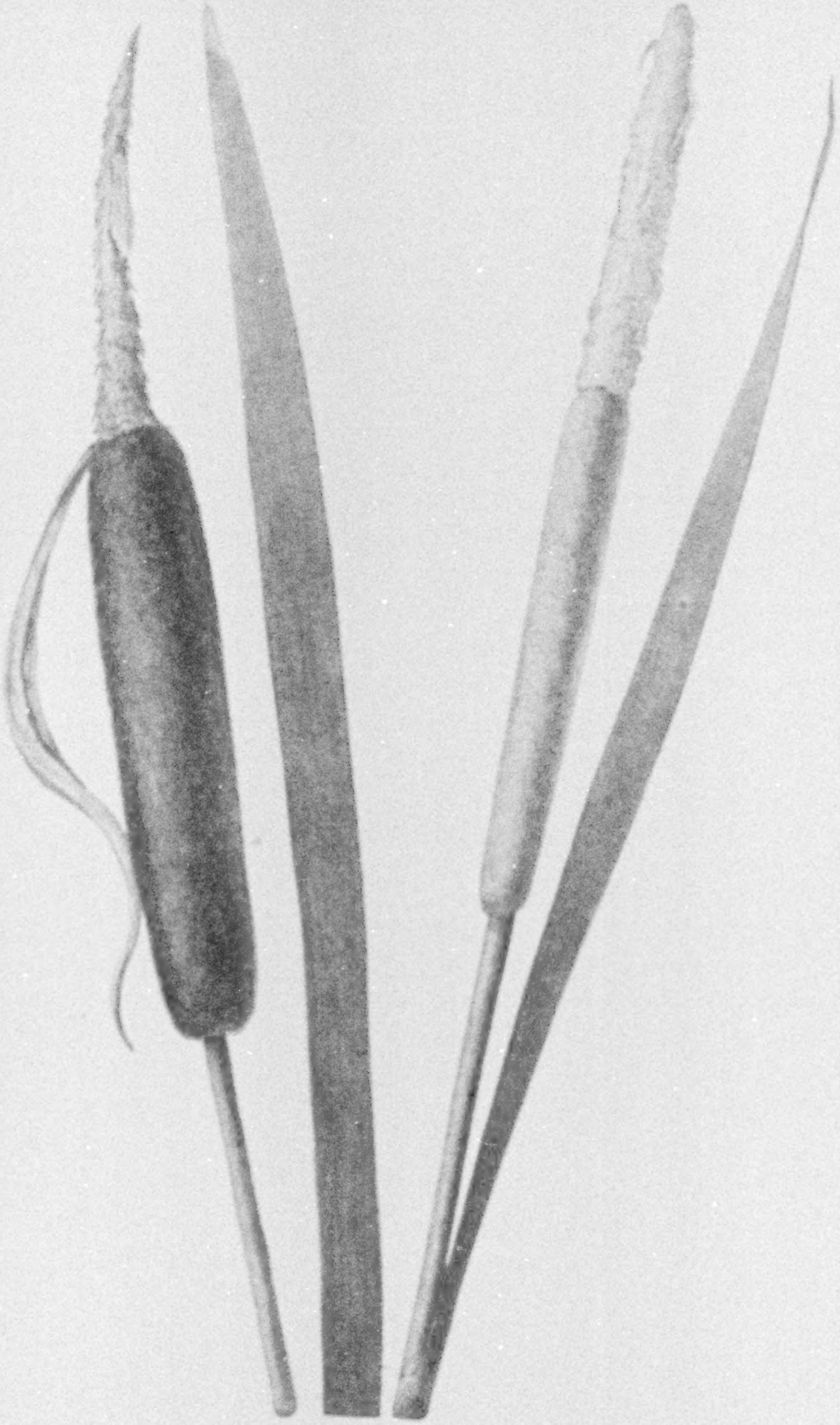
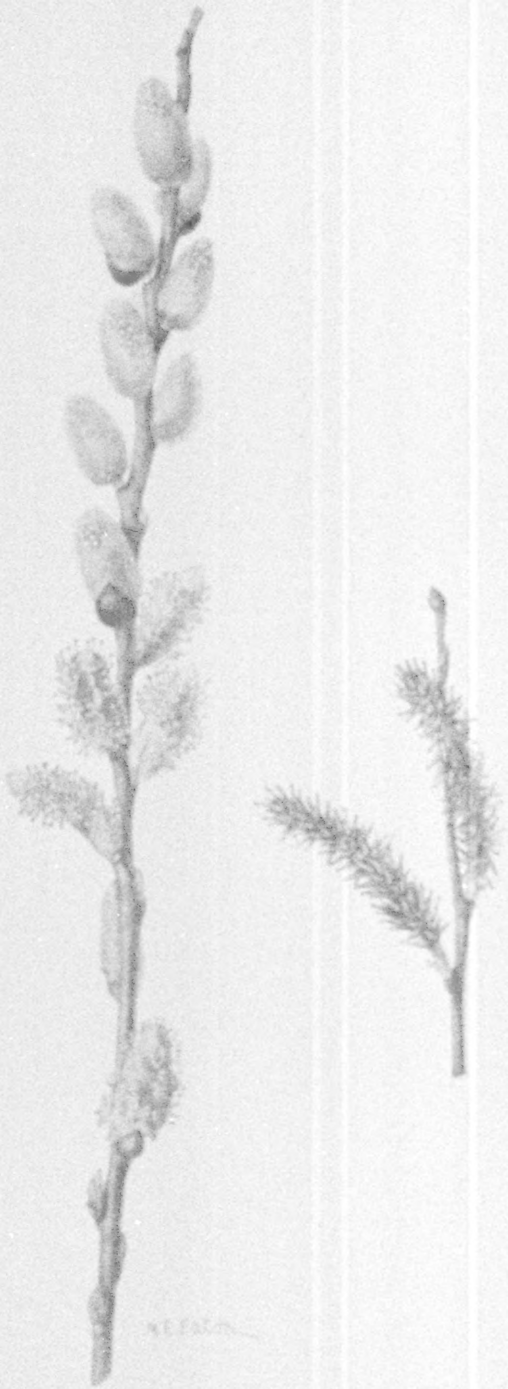


Willow Amsonia
*Amsonia tabernaemontana* Walt.
Dogbane Family



Common Cattail
*Typha latifolia* L.
Cattail Family



Pussy Willow
*Salix discolor* Muhl.
Willow Family

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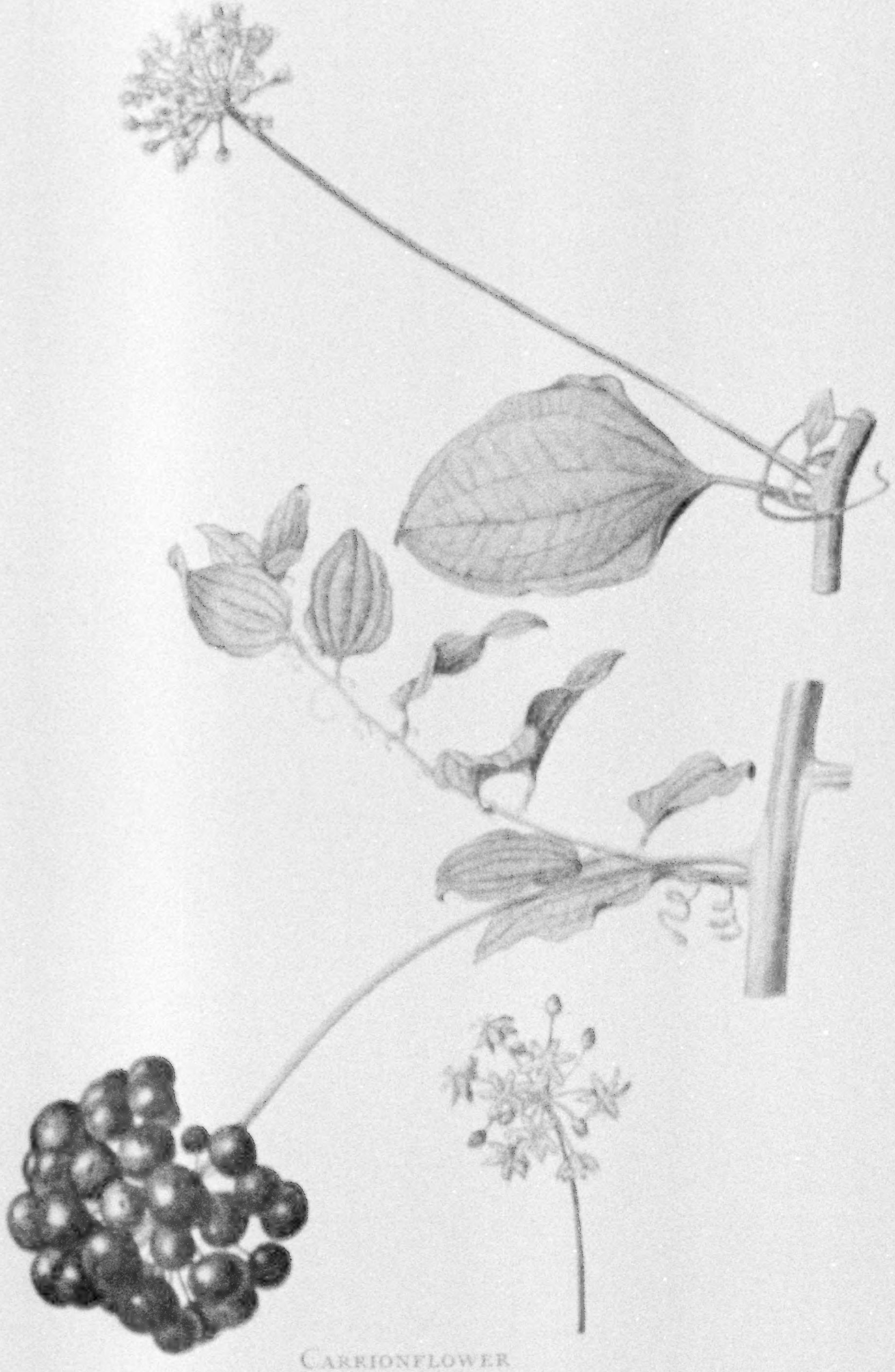
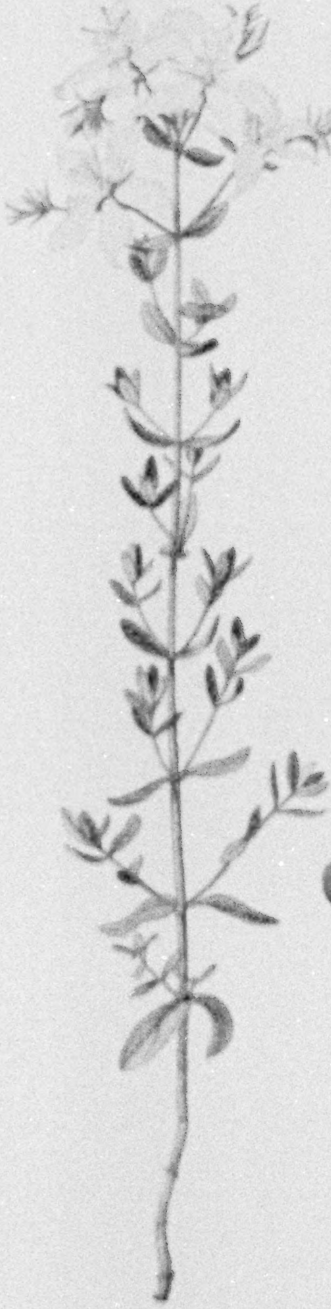
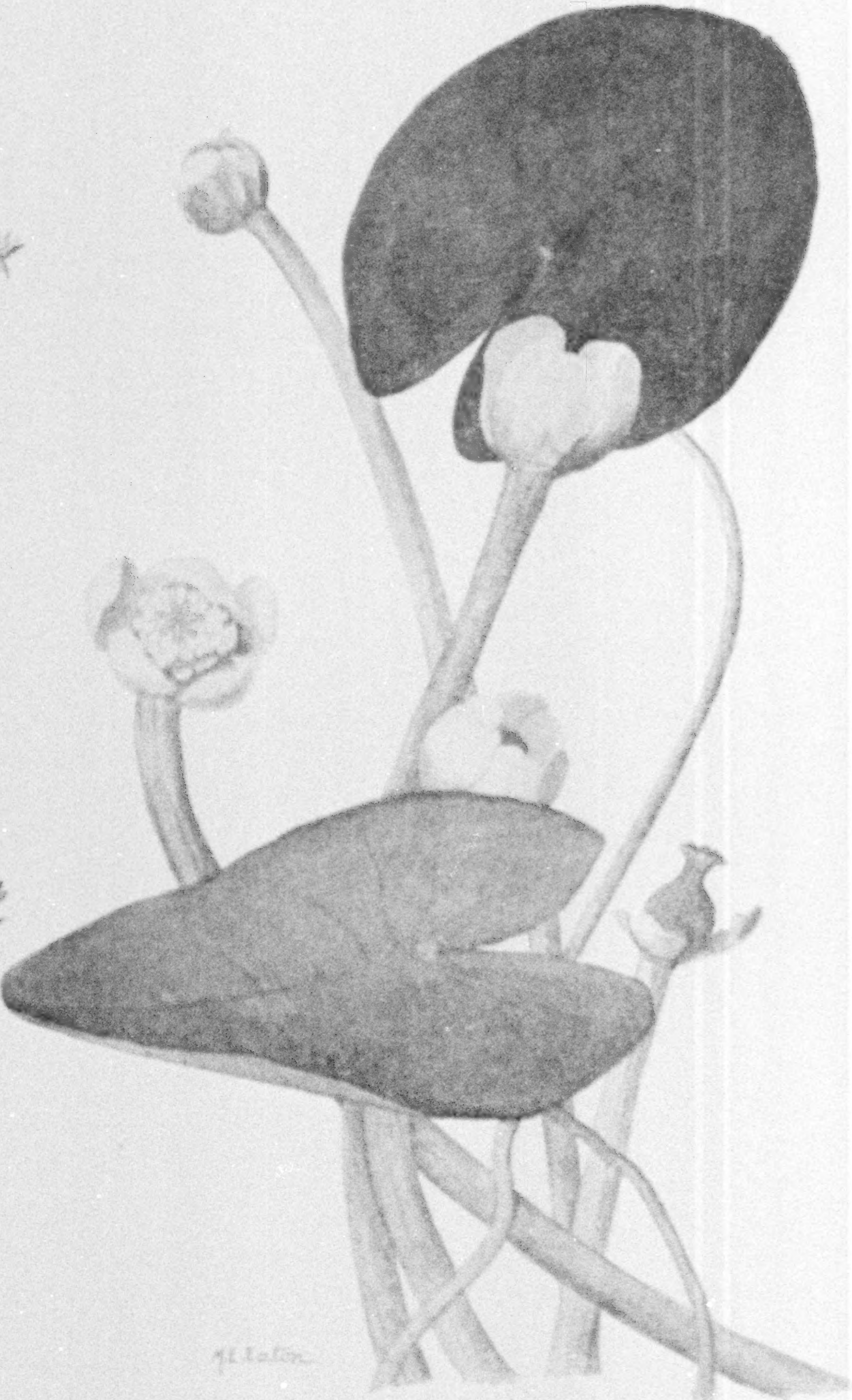


Carrionflower
*Smilax herbacea* L.
Smilax Family



Common St. Johnswort
*Hypericum perforatum* L.
St. Johnswort Family



Small Spatterdock
*Nymphaea microphylla* Pers.
Waterlily Family

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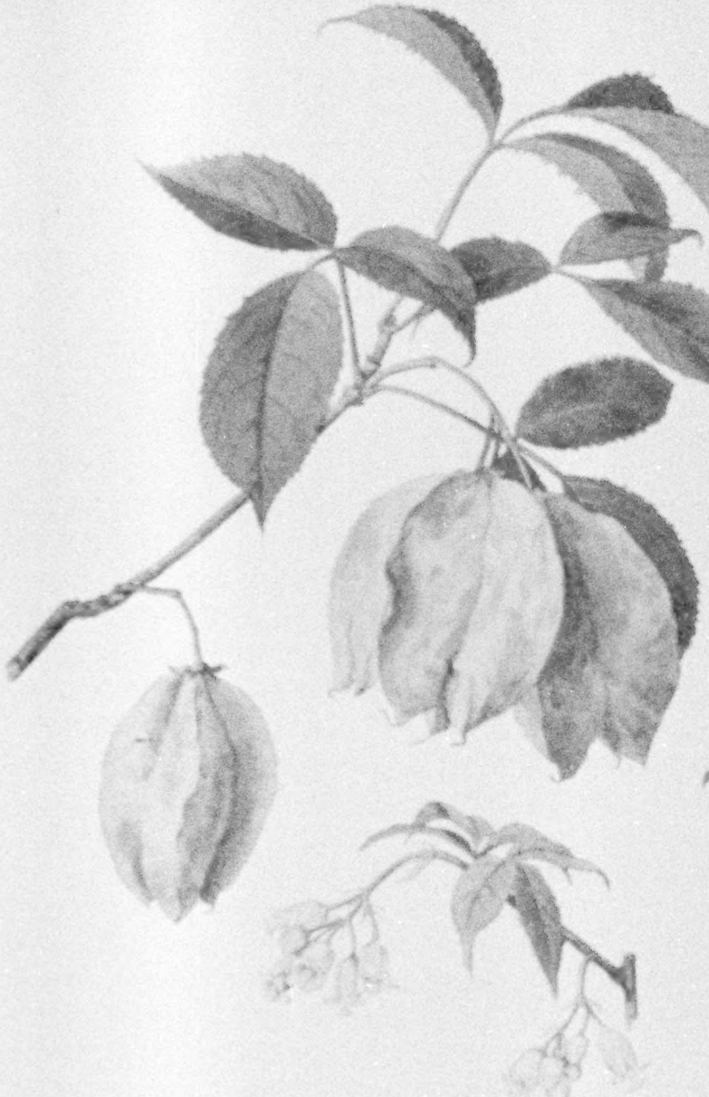
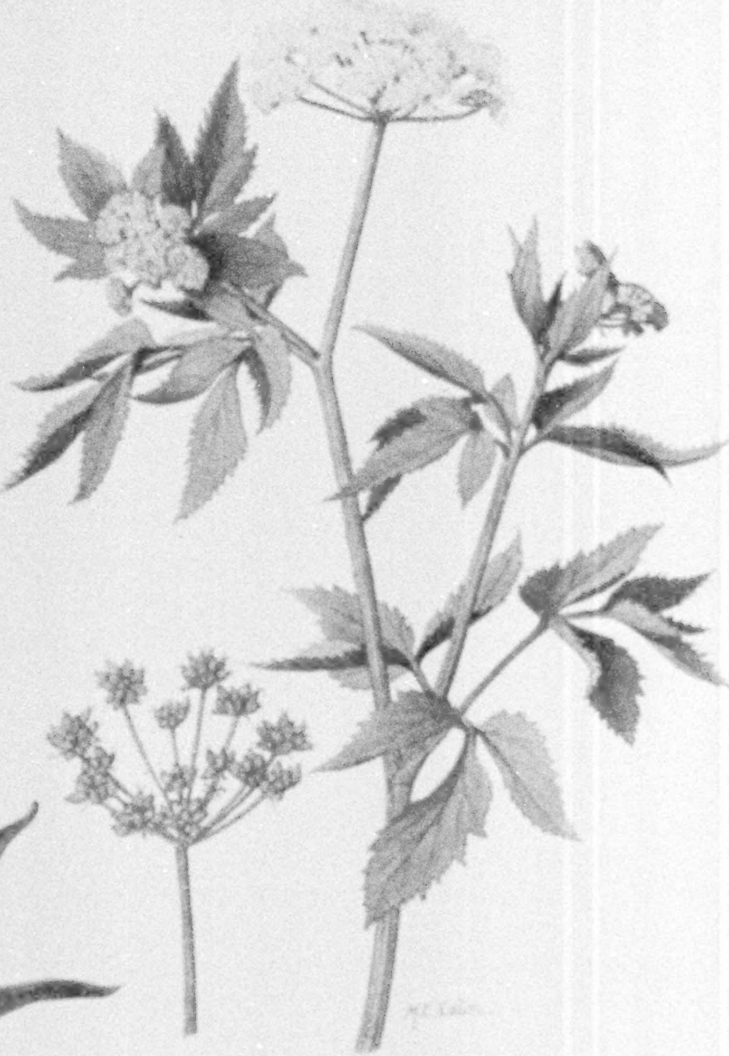
IV



AMERICAN BLADDERNUT
*Staphylea trifolia* L.
Bladdernut Family

VIRGINIA SPRINGBEAUTY
*Claytonia virginica* L.
Purslane Family



GOLDEN MEADOW-PARSNIP
*Zizia aurea* (L.) Koch
Parsley Family

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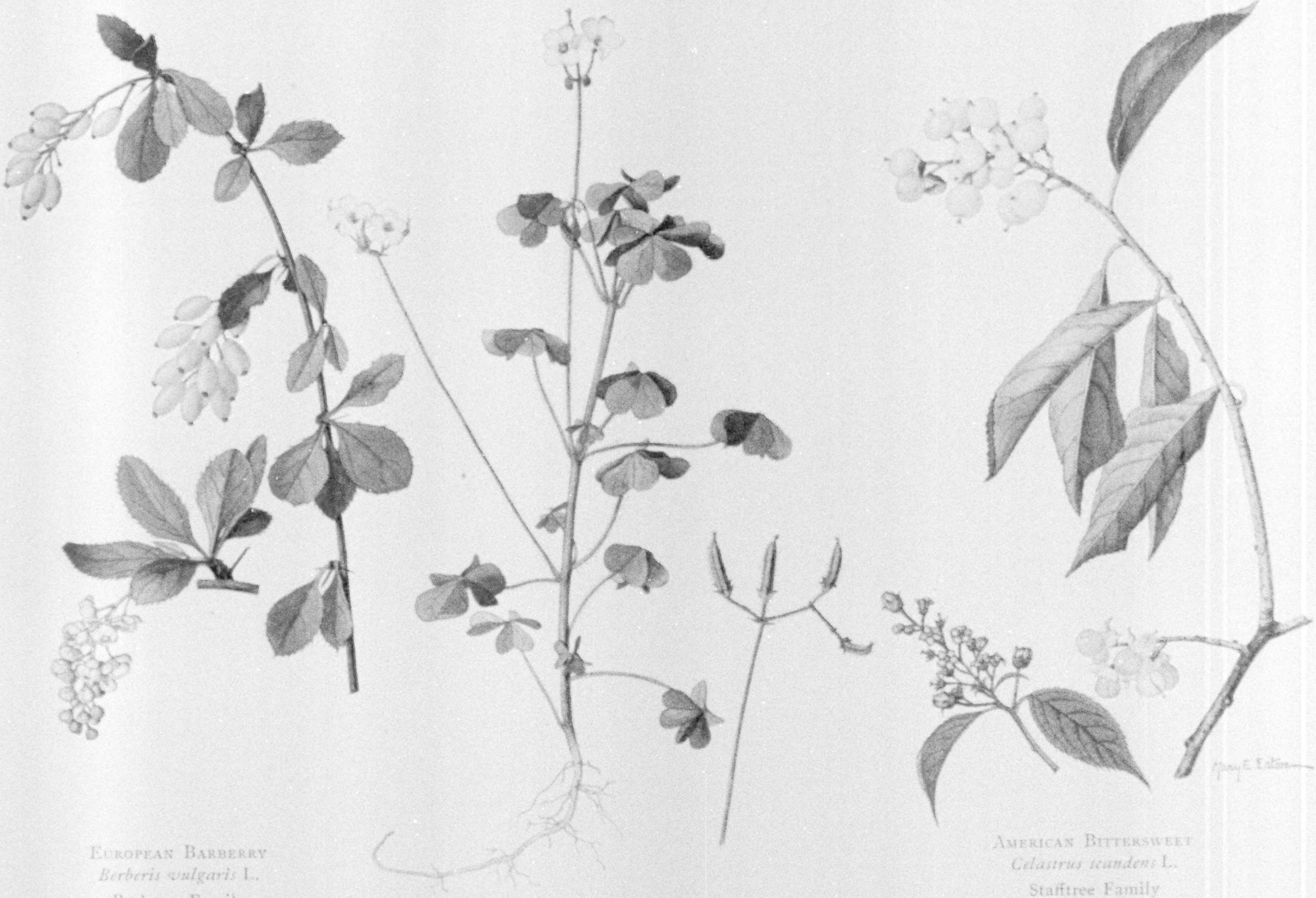
V



European Barberry
*Berberis vulgaris* L.
Barberry Family

Yellow Woodsorrel
*Xanthoxalis cymosa* Small
Sorrel Family

American Bittersweet
*Celastrus scandens* L.
Stafftree Family

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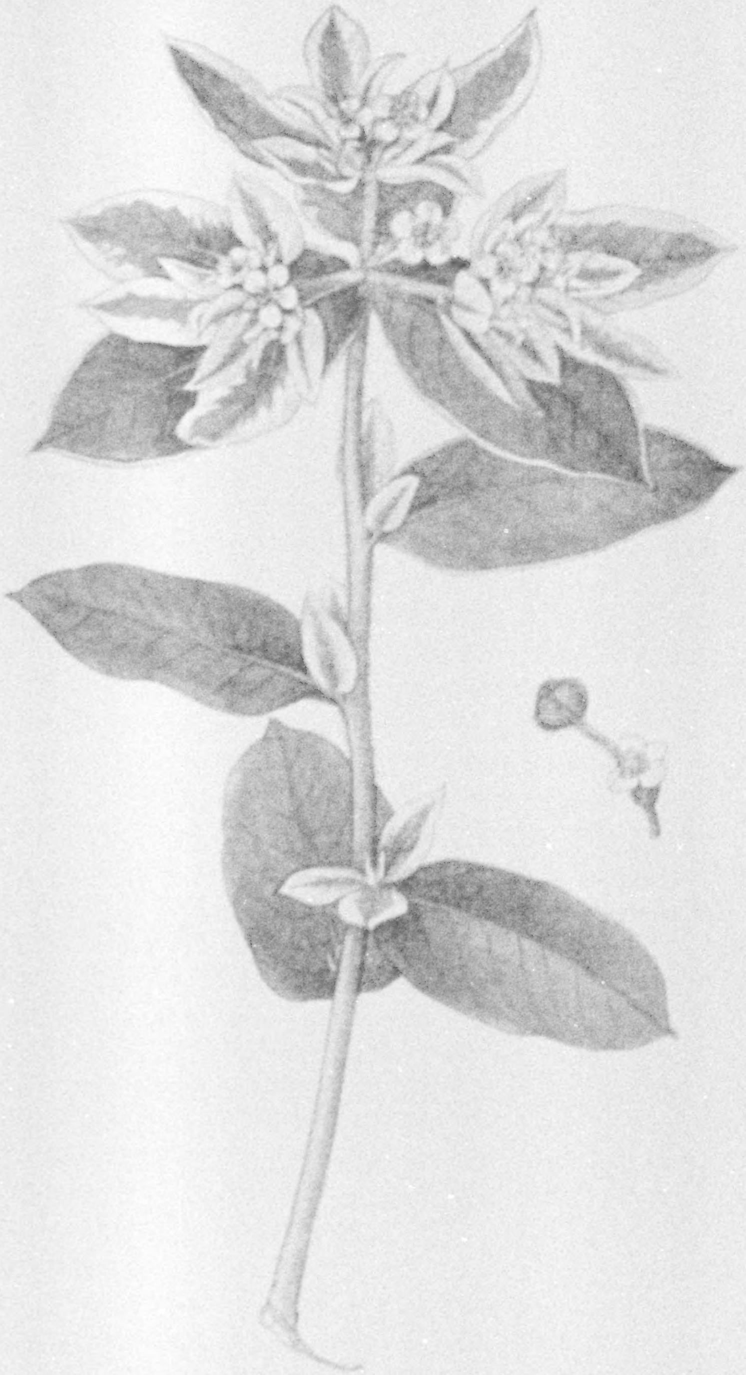
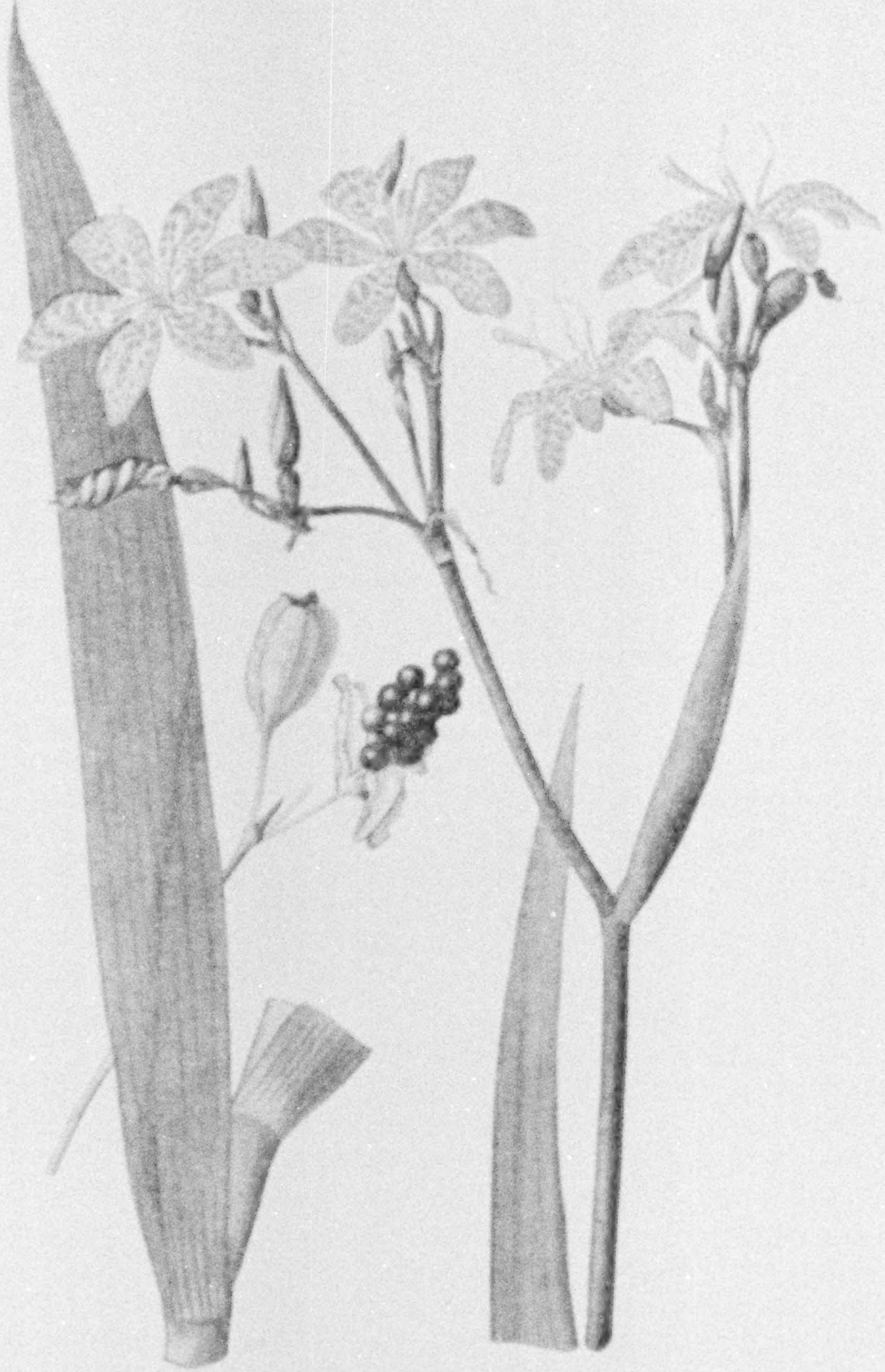
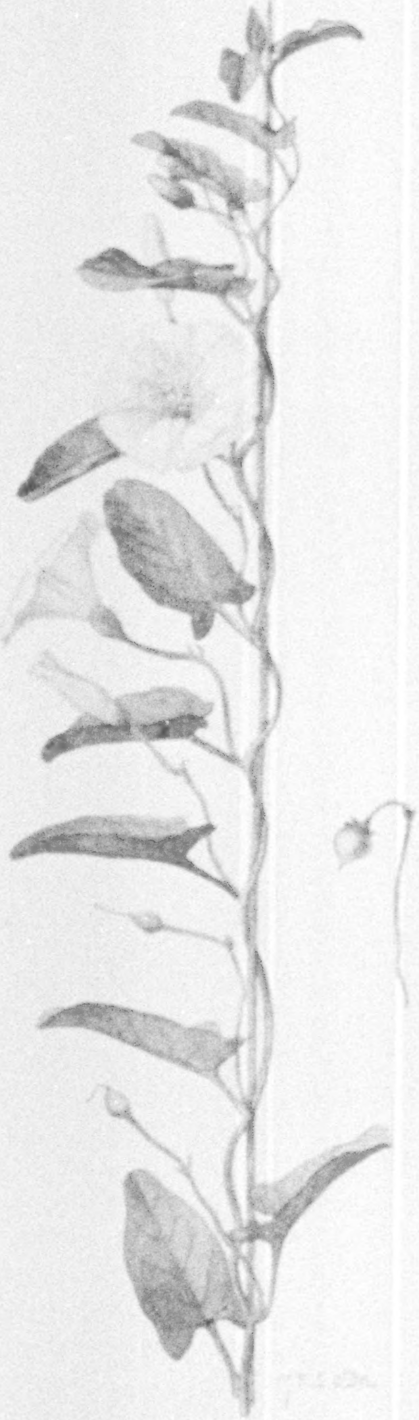
VI



SNOW-ON-THE-MOUNTAIN
*Dichrophyllum marginatum* (Pursh) Kl. & Garcke
Spurge Family



BLACKBERRY-LILY
*Gemmingia chinensis* (L.) Kuntze
Iris Family



SMALL BINDWEED
*Convolvulus arvensis* L.
Morning-glory Family

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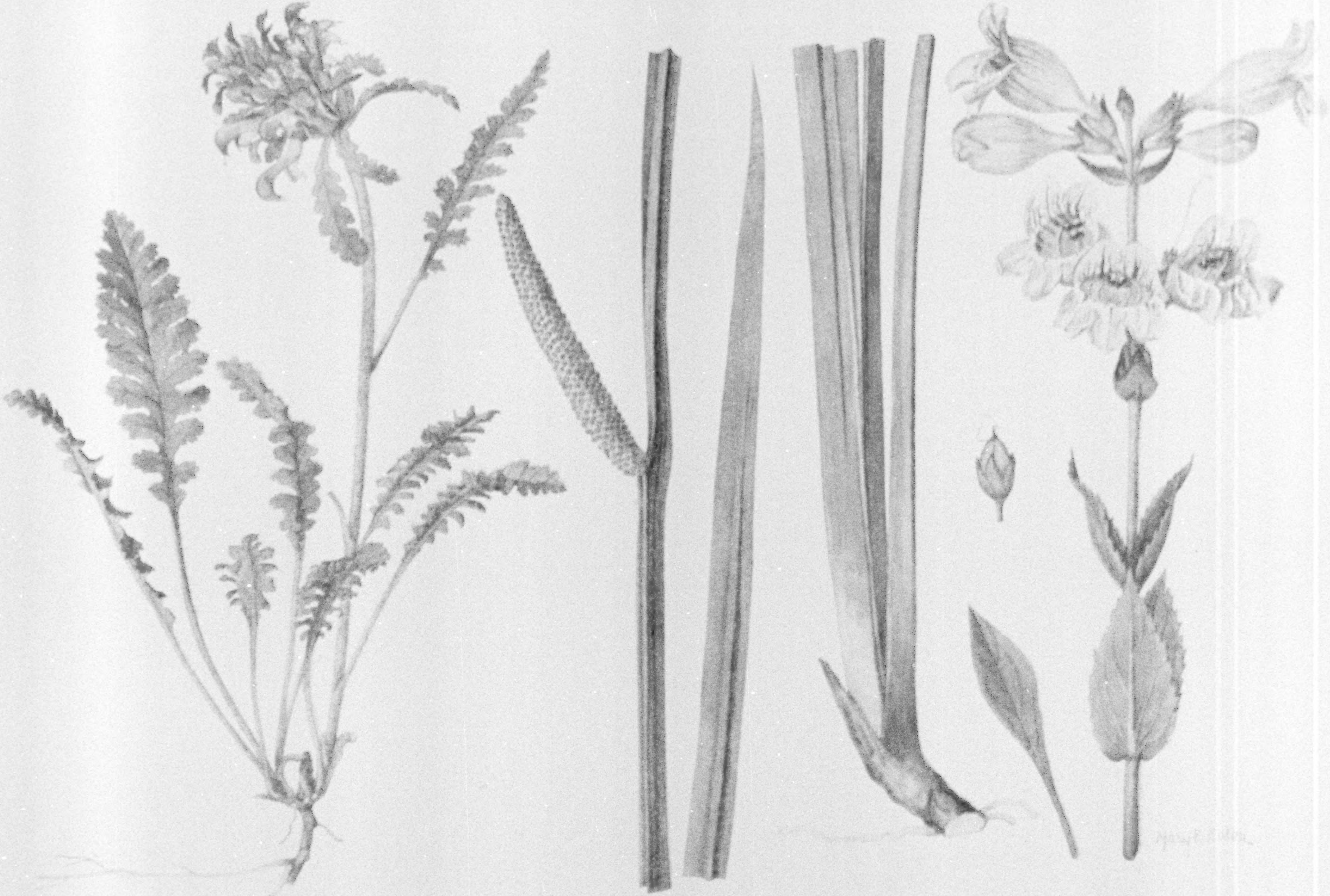
VII



WOODBETONY
*Pedicularis canadensis* L.
Figwort Family

SWEETFLAG
*Acorus calamus* L.
Arum Family

COBAEA PENTSTEMON
*Pentstemon cobaea* Nutt.
Figwort Family

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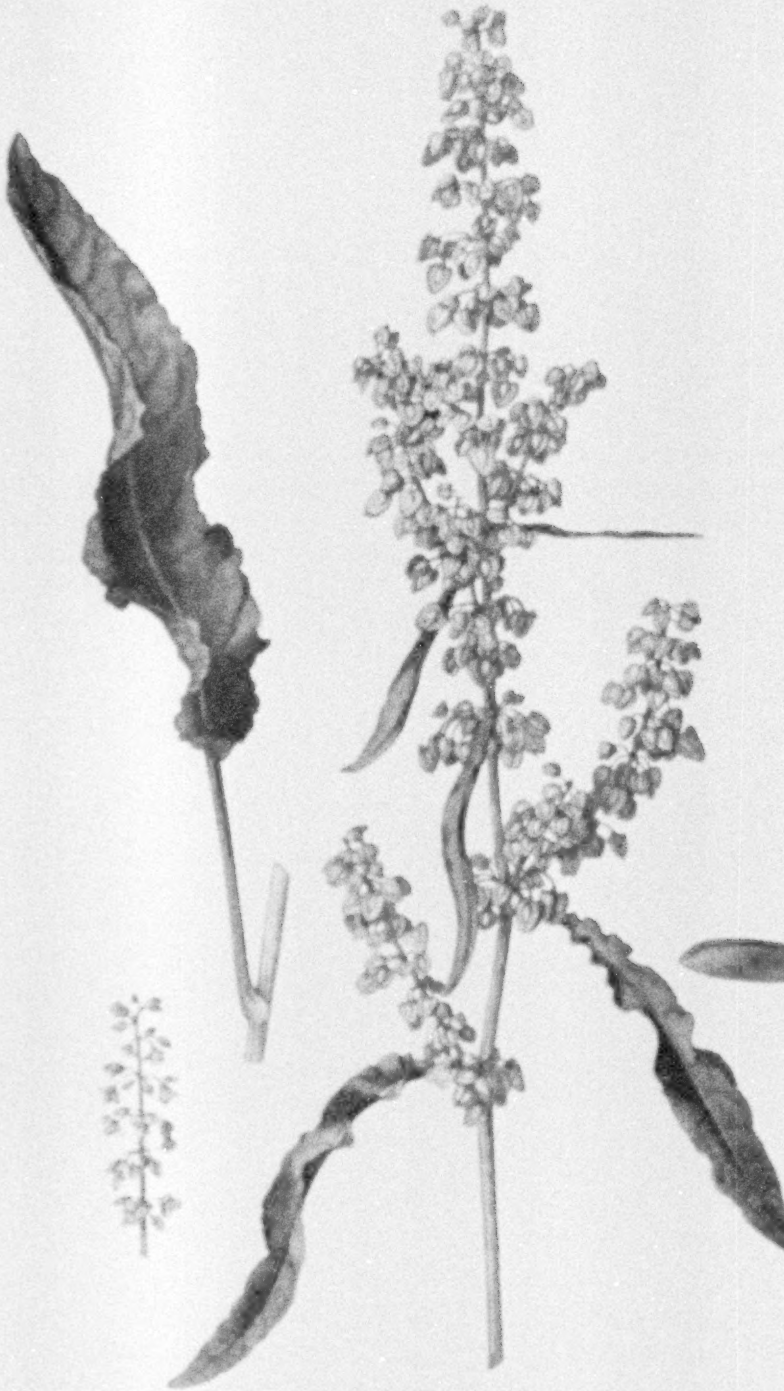
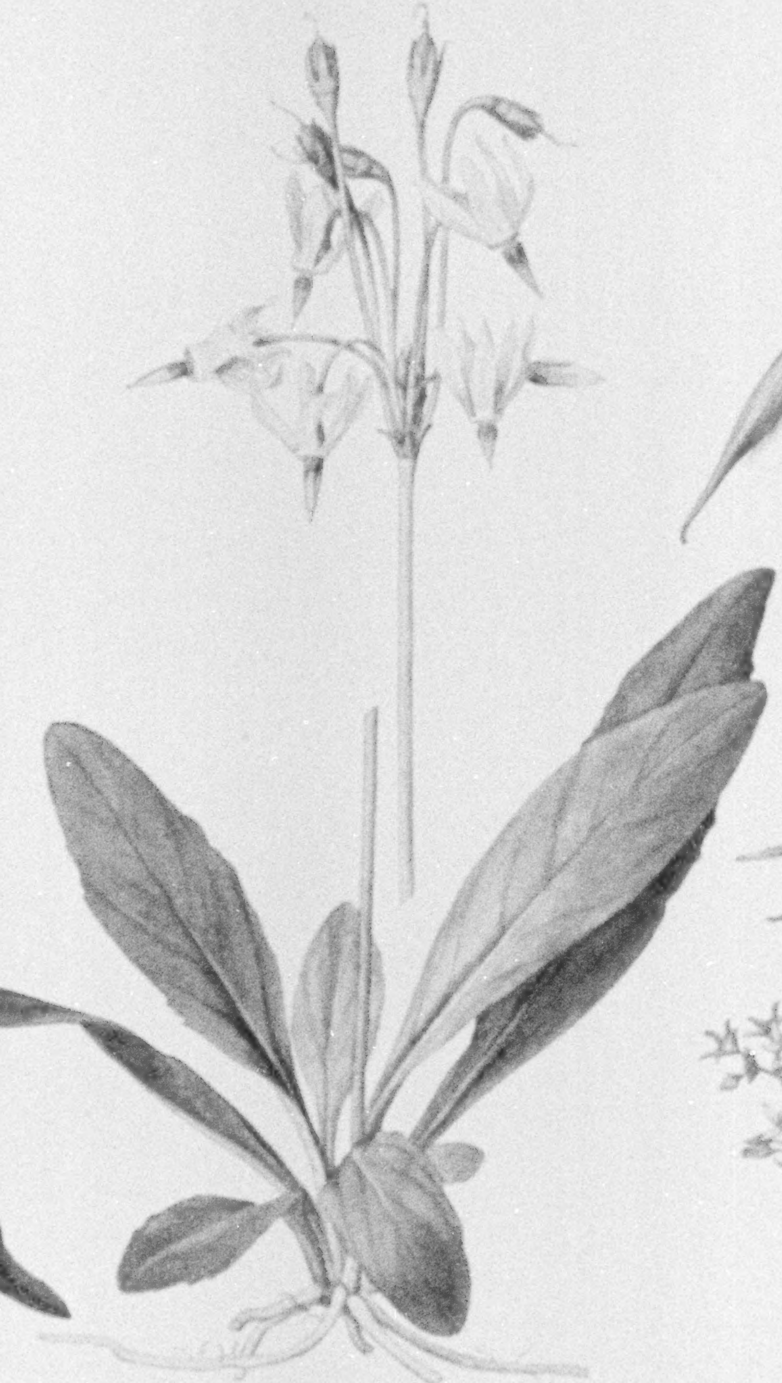
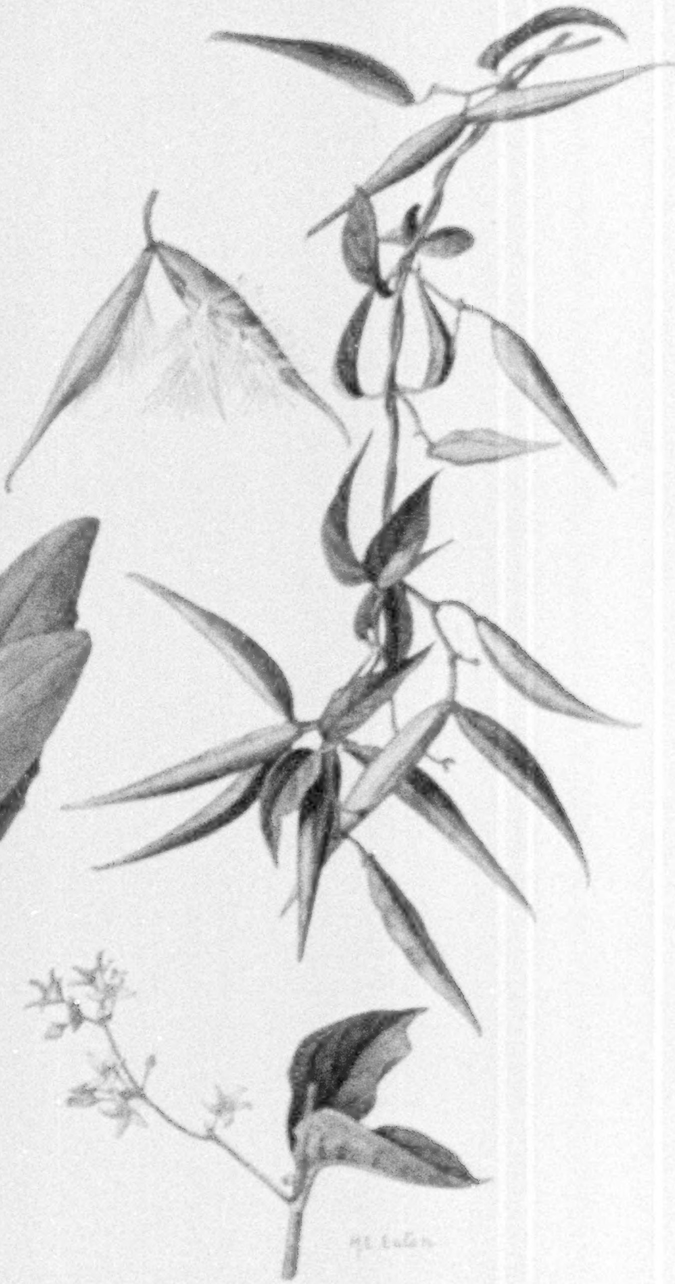
VIII



Curly Dock
*Rumex crispus* L.
Buckwheat Family



Common Shootingstar
*Dodecatheon meadia* L.
Primrose Family



Black Swallow-wort
*Cynanchum nigrum* (L.) Pers.
Milkweed Family

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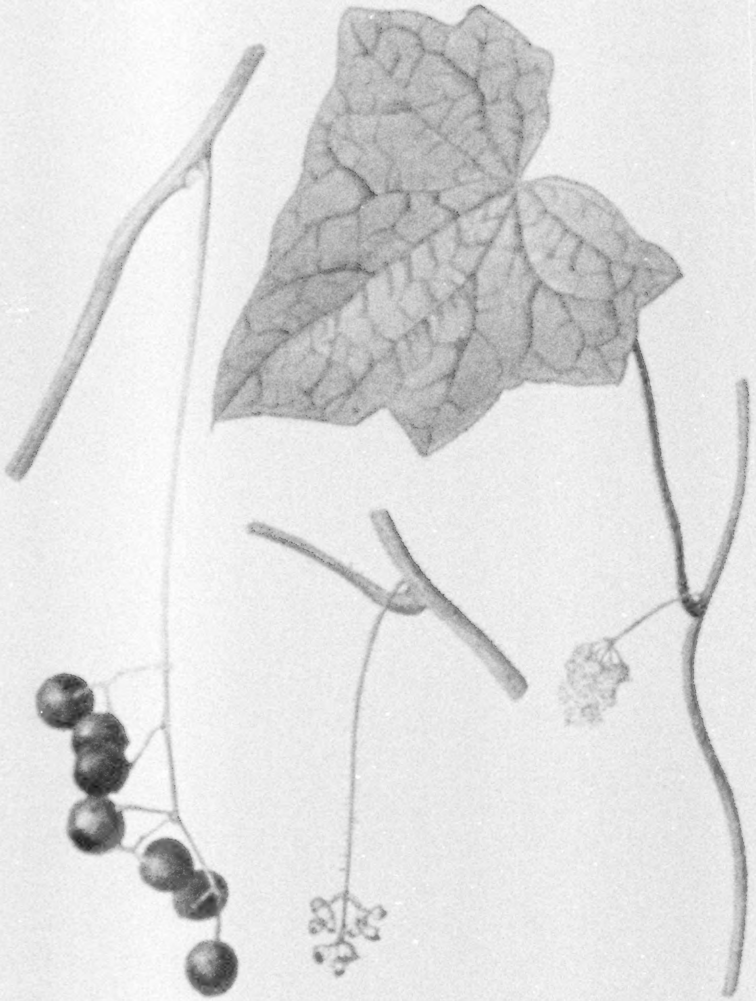
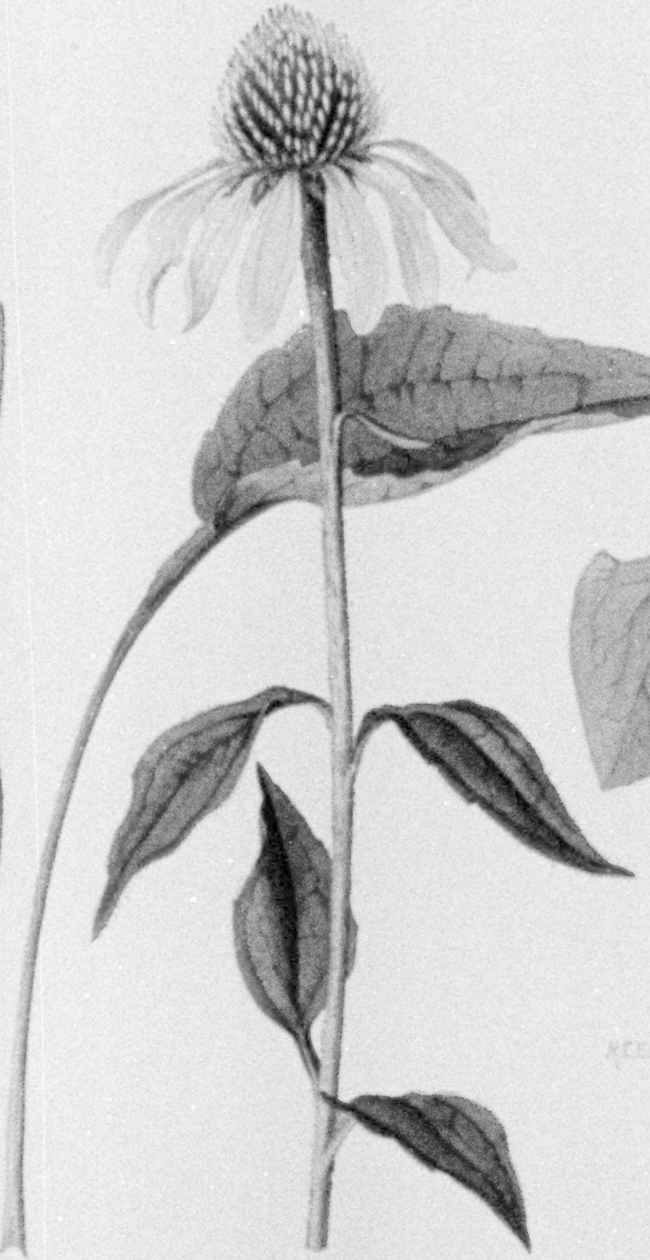
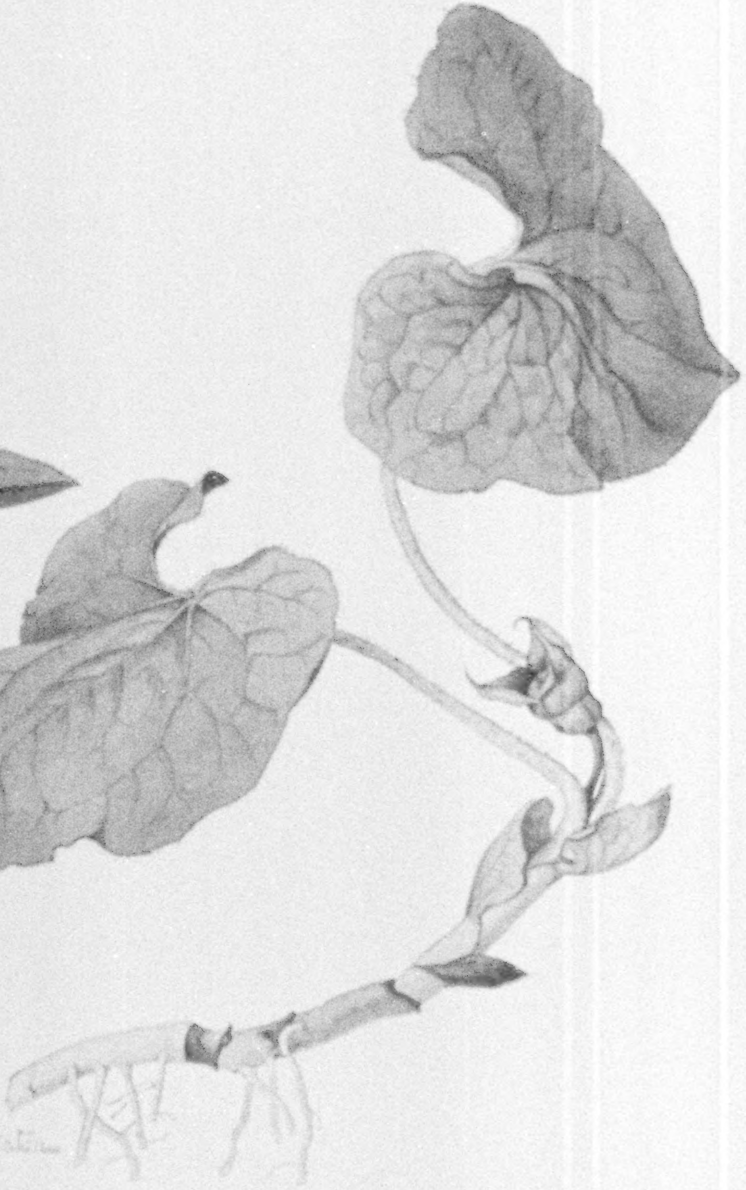


COMMON MOONSEED
*Menispermum canadense* L.
Moonseed Family



PURPLE CONEFLOWER
*Echinacea purpurea* (L.) Moench
Aster Family



CANADA WILDGINGER
*Asarum canadense* L.
Birthwort Family

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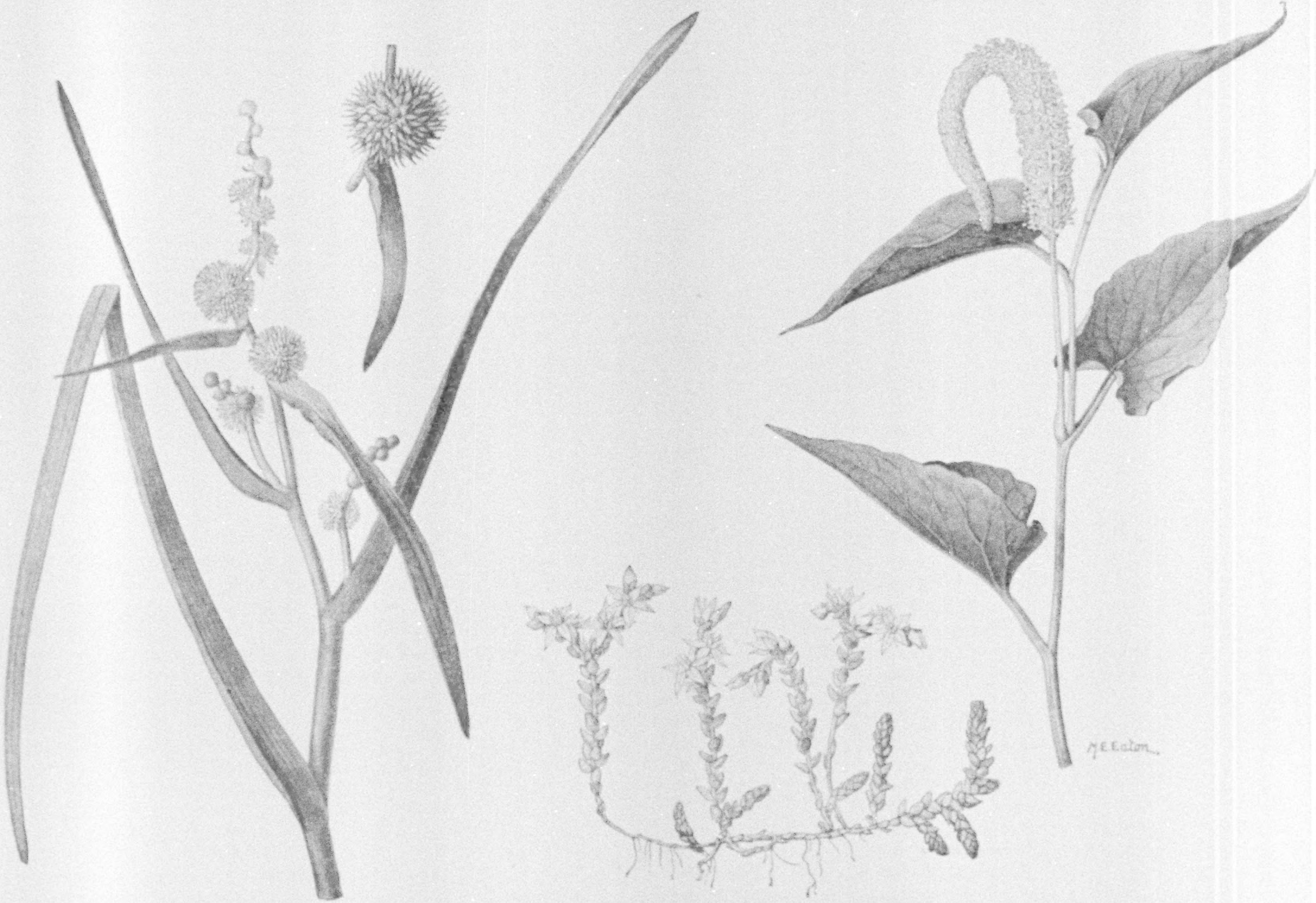
X



Branching Bur-reed
*Sparganium androcladum* (Engelm.) Morong
Bur-reed Family

Goldmoss
*Sedum acre* L.
Orpine Family

Lizardtail
*Saururus cernuus* L.
Lizardtail Family

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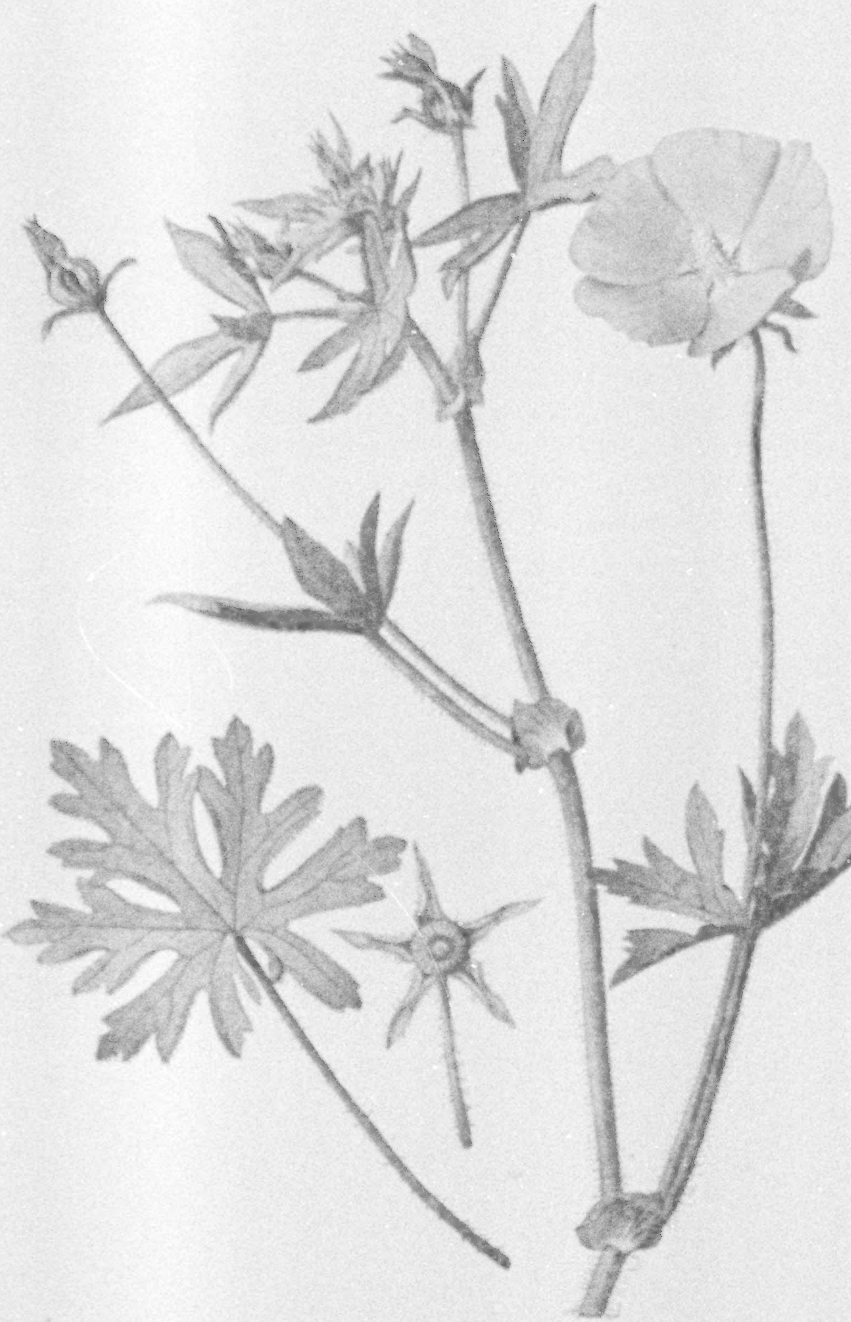
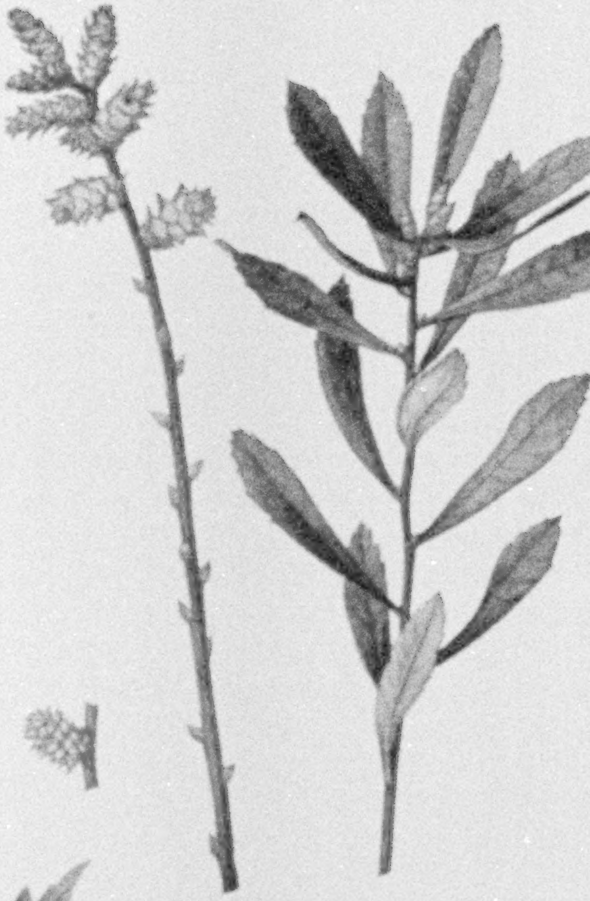
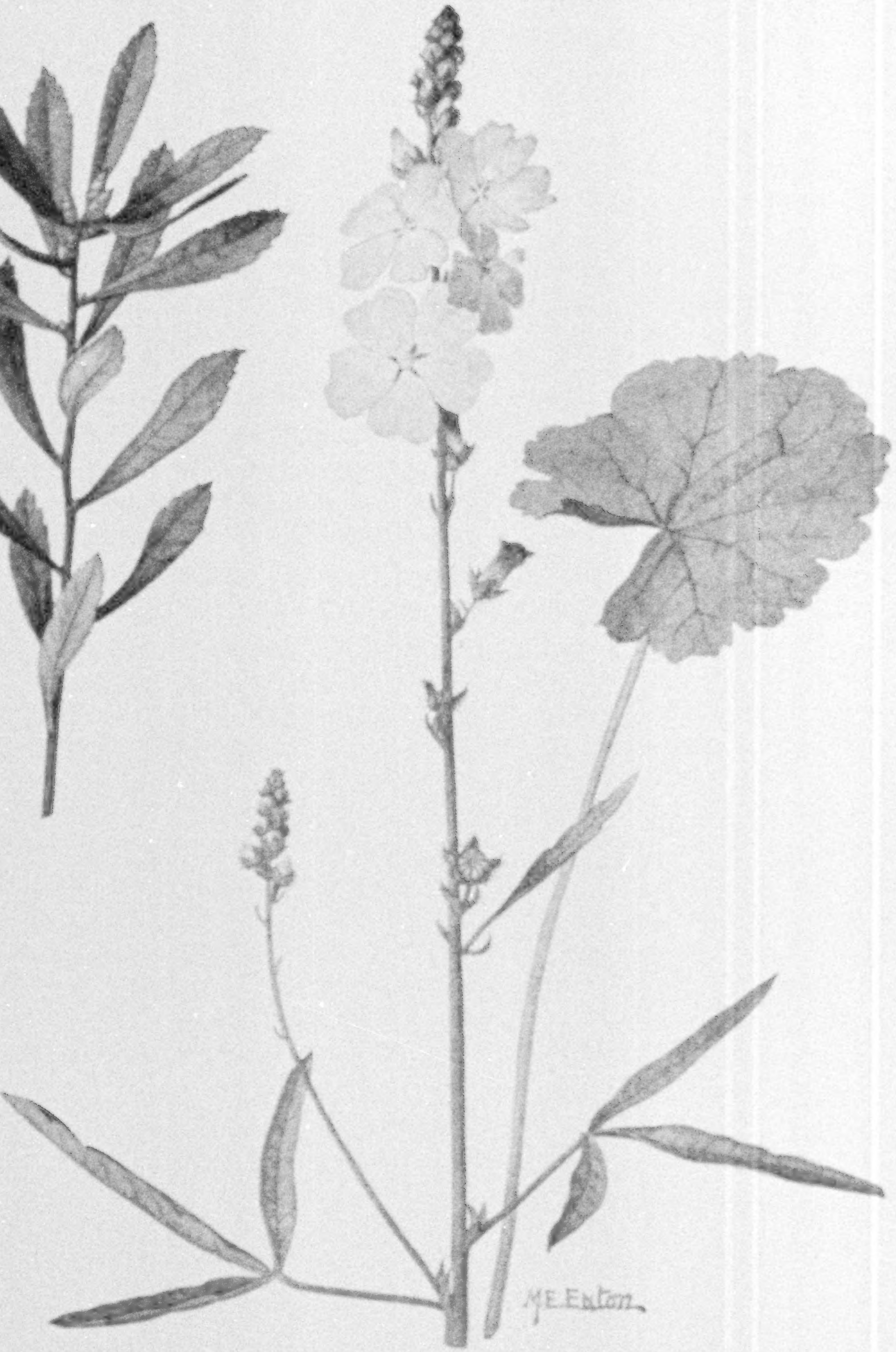


Low Poppy-mallow
*Callirhoe involucrata* (T. & G.) A. Gray
Mallow Family



Sweet Gale
*Myrica gale* L.
Bayberry Family



Checkerbloom
*Sidalcea malvaeflora* (Moc. & Sesse) A. Gray
Mallow Family

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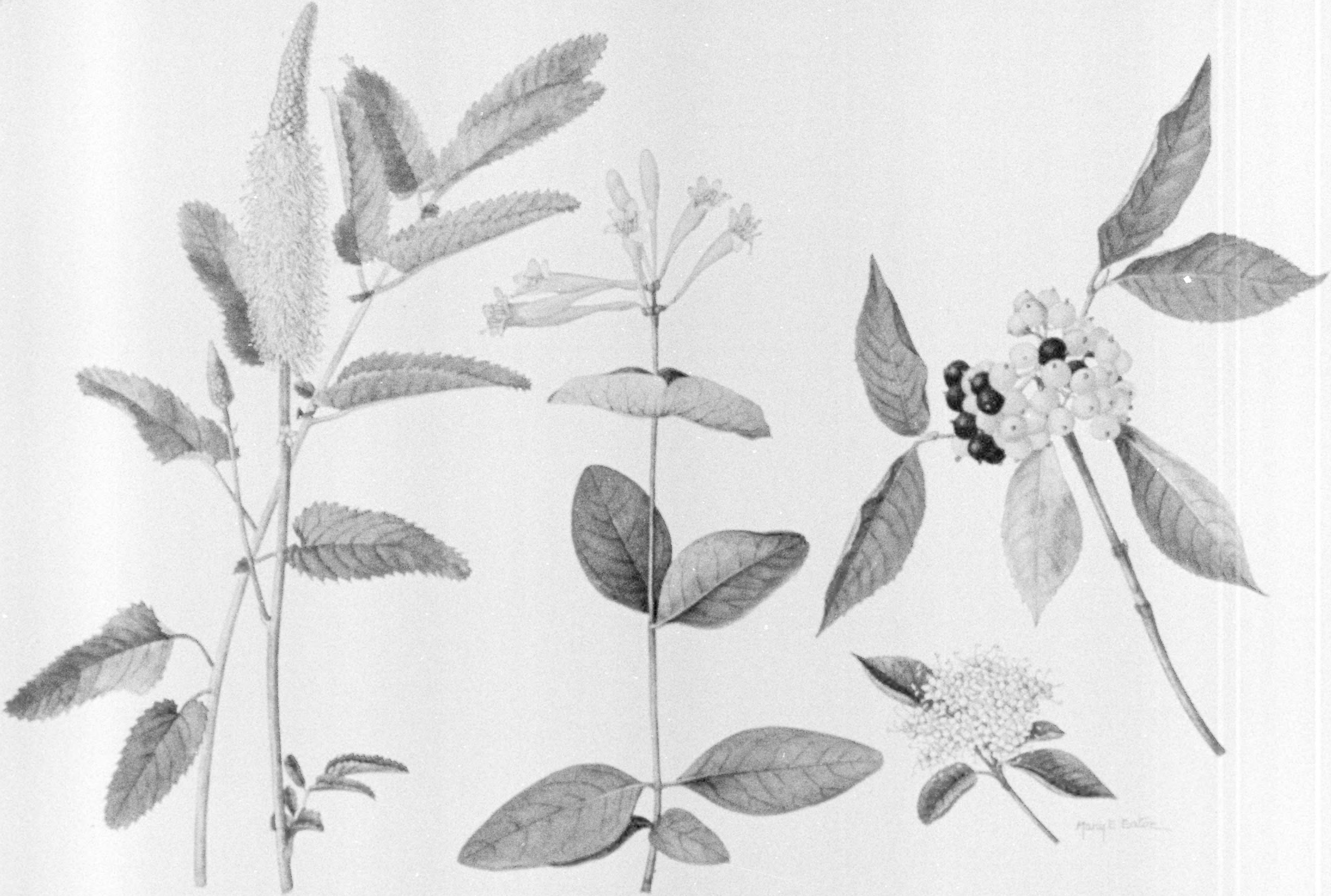

AMERICAN BURNET
*Sanguisorba canadensis* L.
Rose Family

TRUMPET HONEYSUCKLE
*Lonicera sempervirens* L.
Honeysuckle Family

WITHE-ROD
*Viburnum cassinoides* L.
Honeysuckle Family

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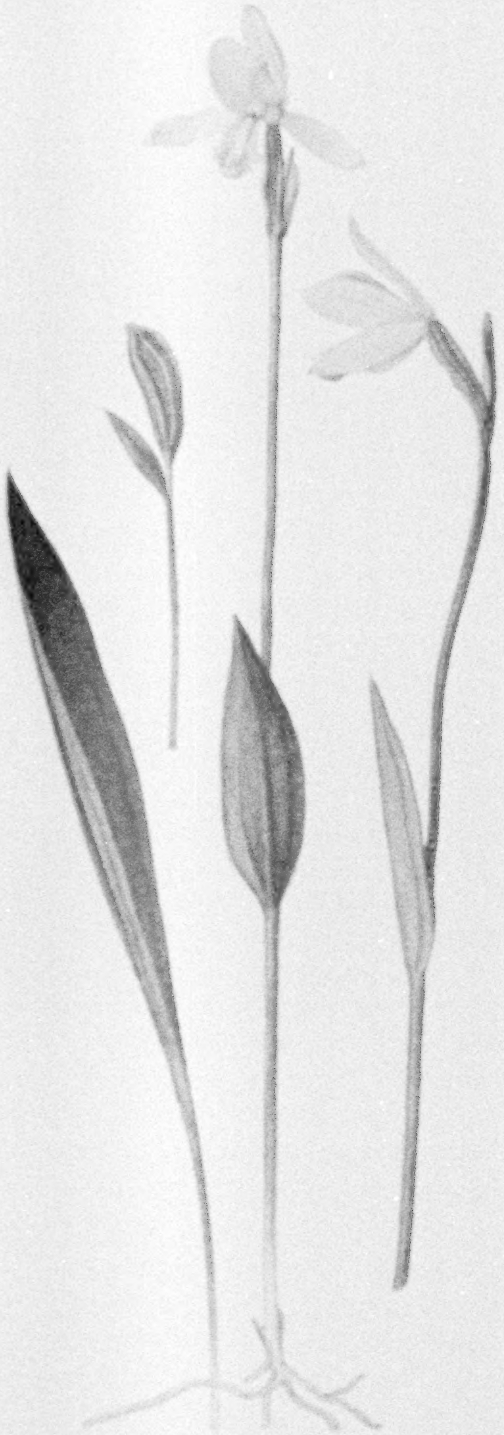
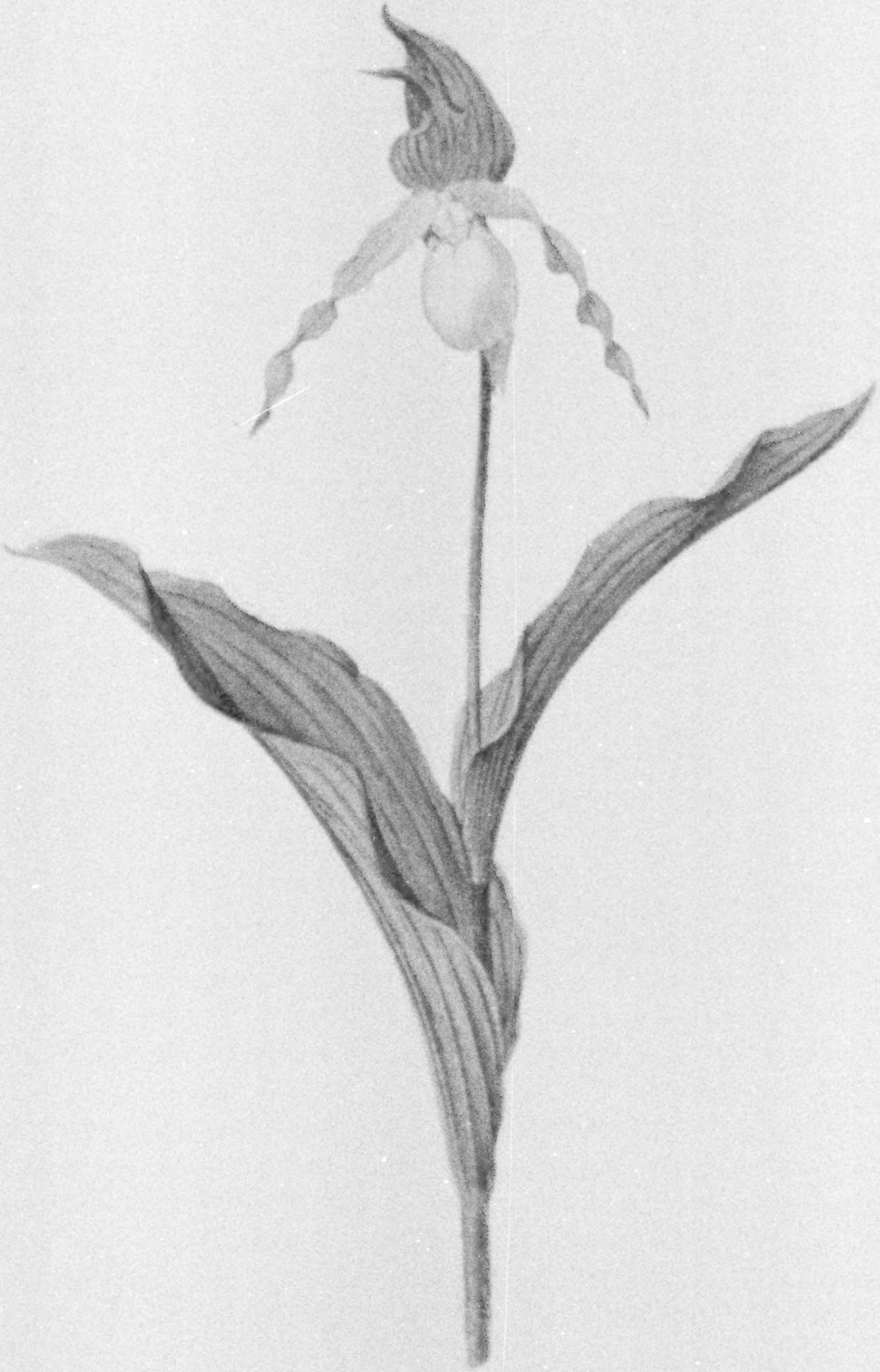
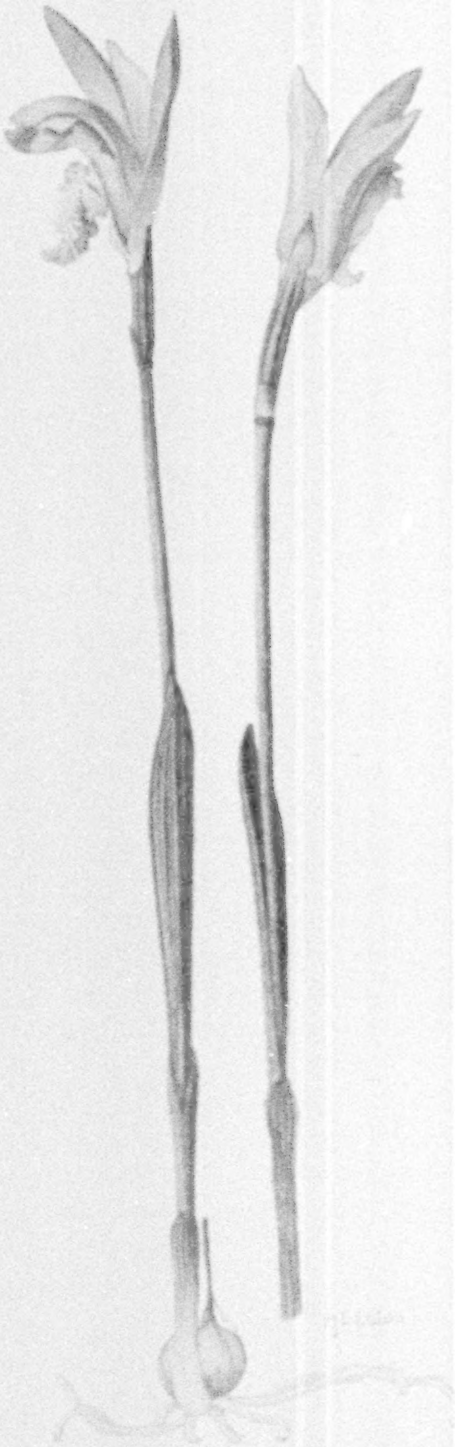


Rose Pogonia
*Pogonia ophioglossoides* (L.) Ker
Orchis Family



Small Yellow Ladyslipper
*Cypripedium parviflorum* Salisb.
Orchis Family



Arethusa
*Arethusa bulbosa* L.
Orchis Family

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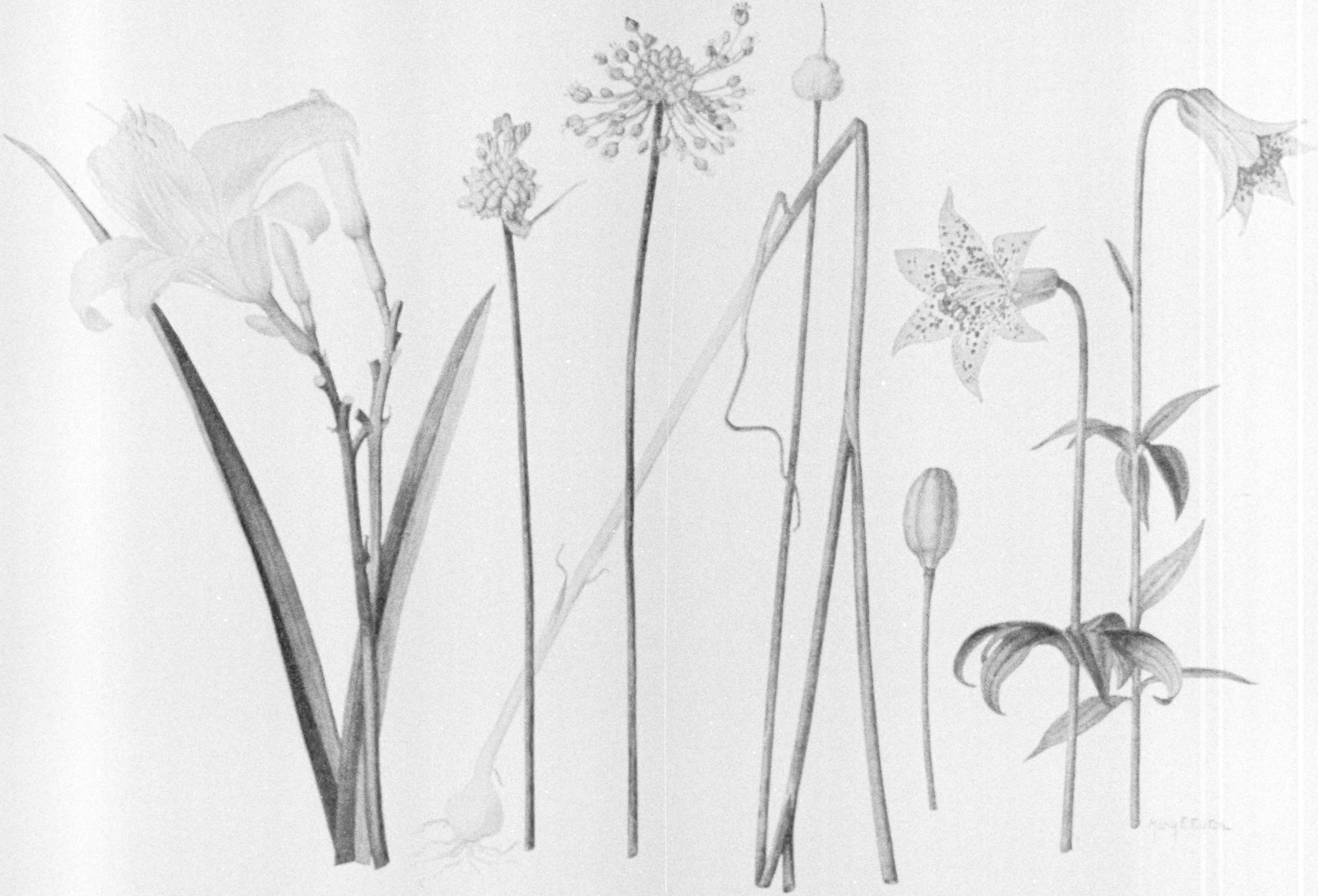
XIV



TAWNY DAYLILY
*Hemerocallis fulva* L.
Lily Family

FIELD GARLIC
*Allium vineale* L.
Lily Family

GRAYS LILY
*Lilium grayi* S. Wats.
Lily Family

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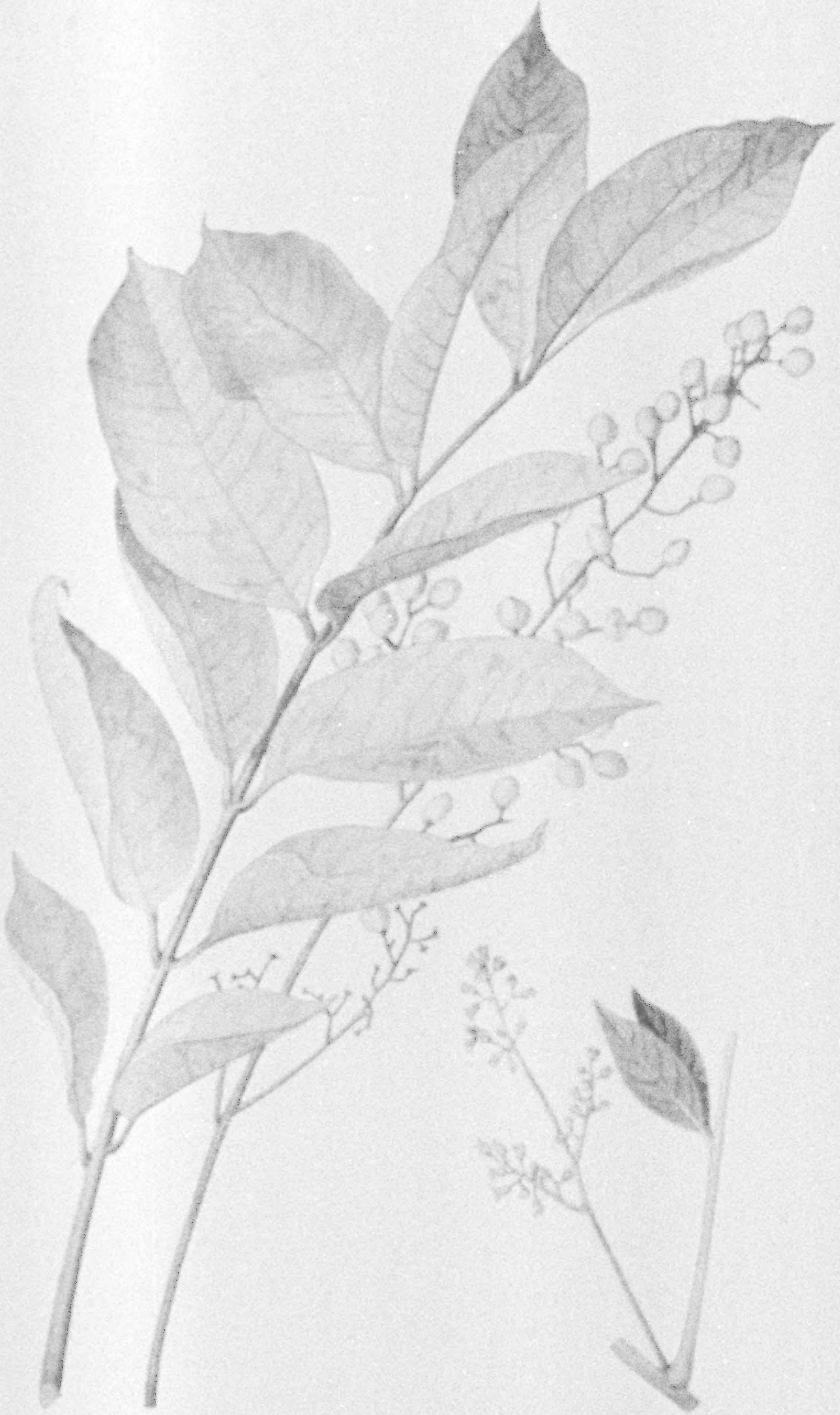
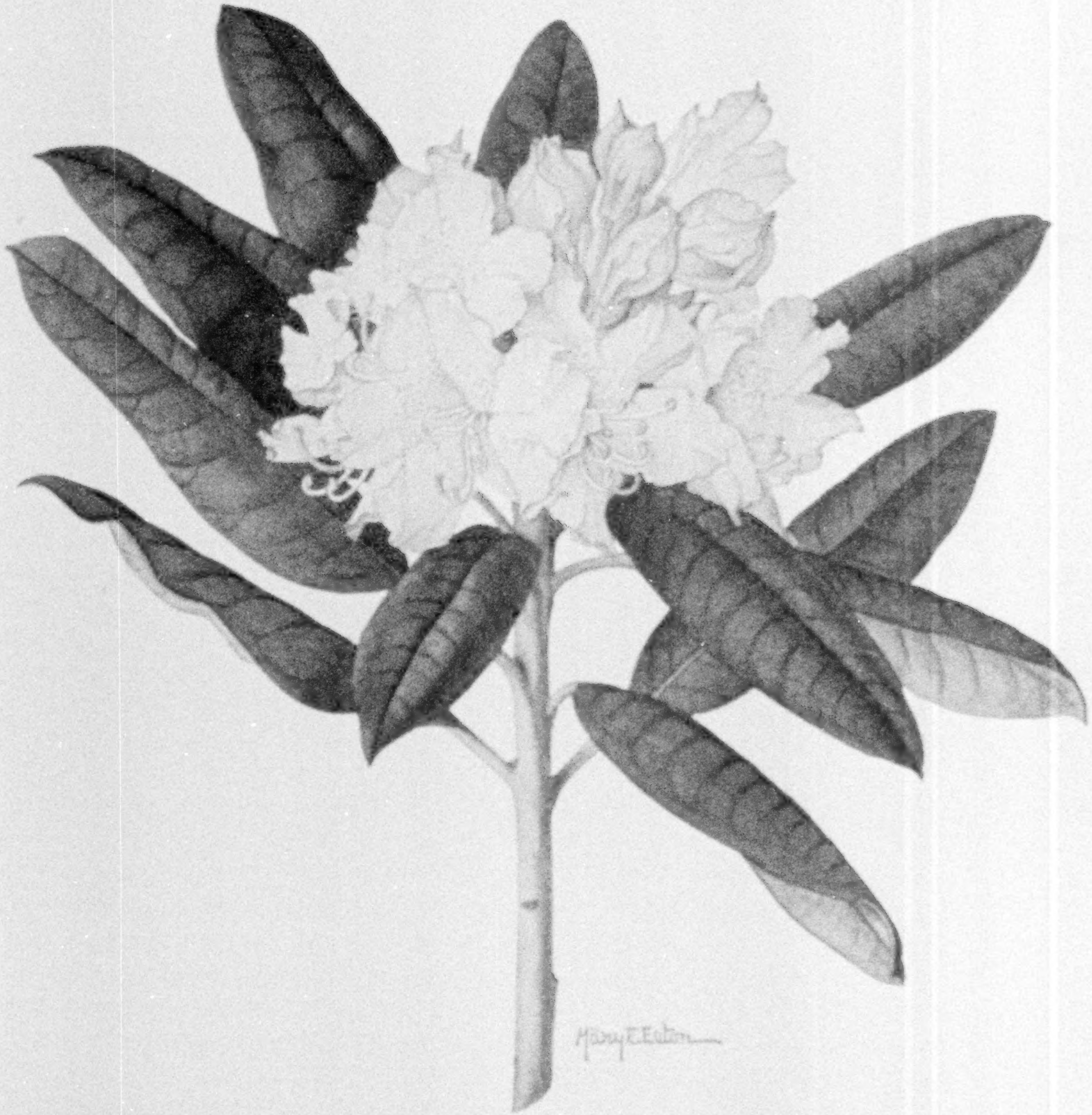


Poison Sumac
*Toxicodendron vernix* (L.) Kuntze
Sumac Family



California Rhododendron
*Rhododendron californicum* Hooker
Heath Family

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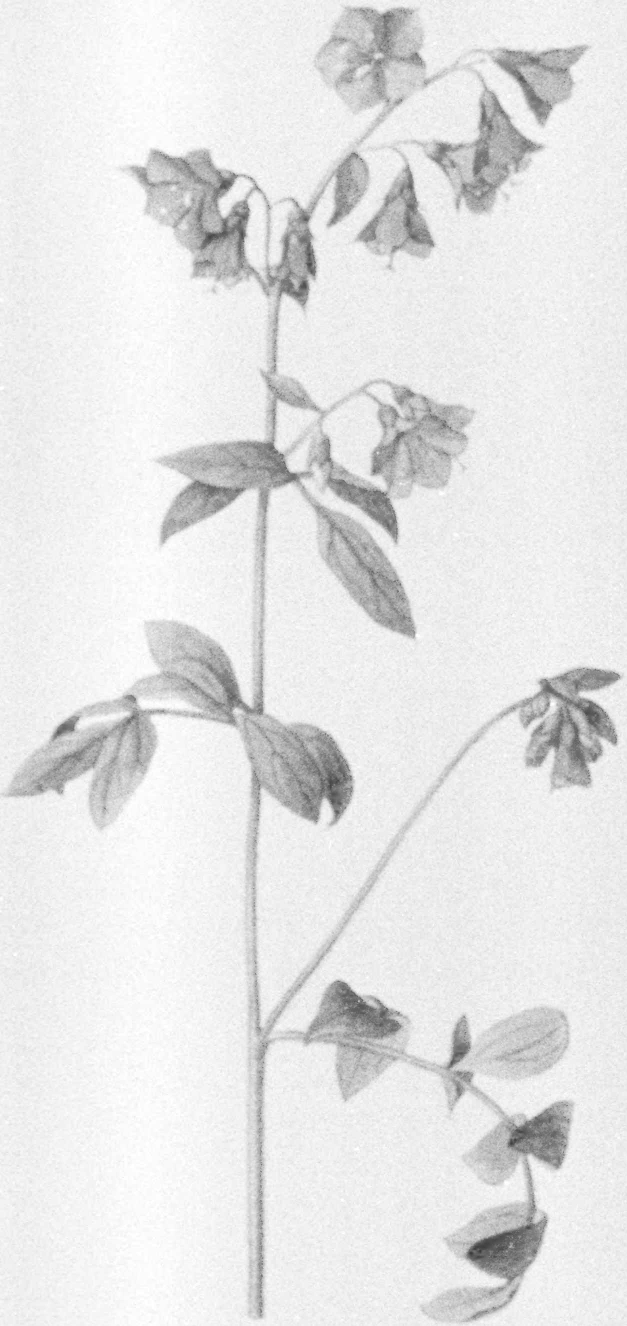
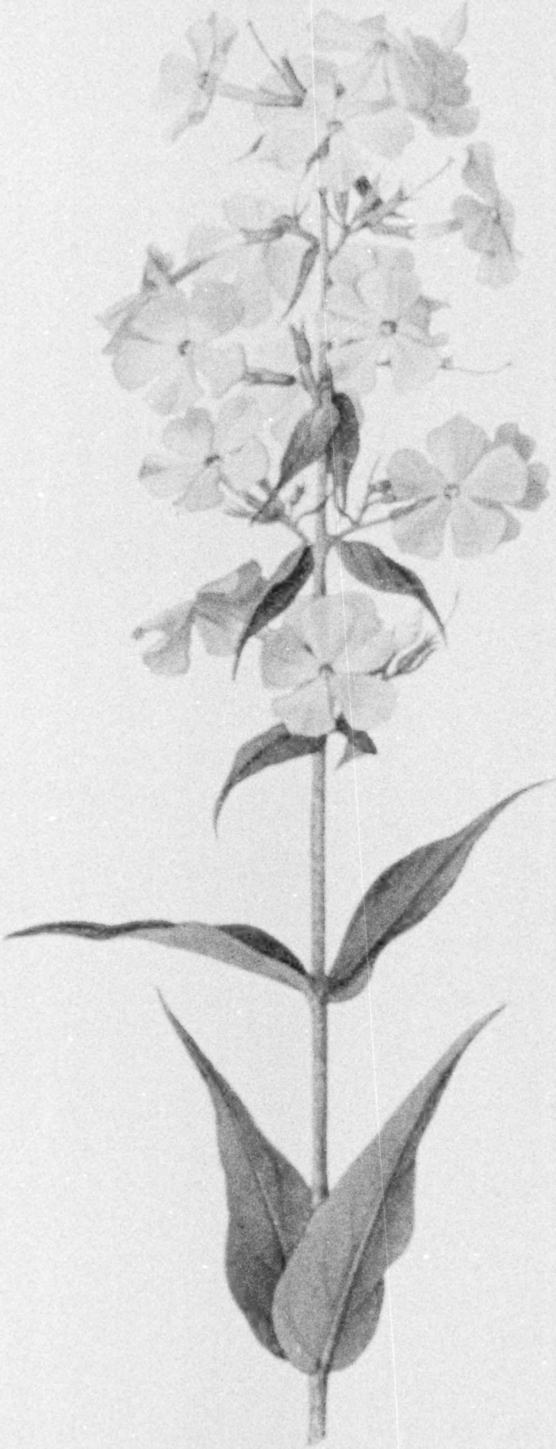
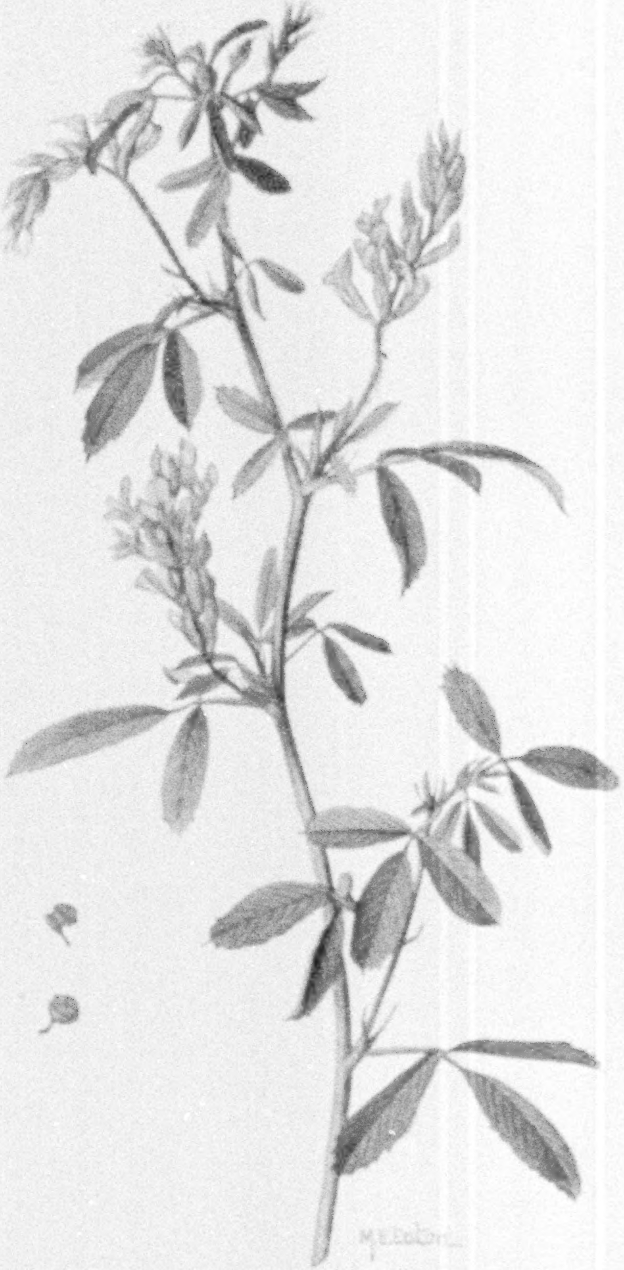


Creeping Polemonium
*Polemonium reptans* L.
Phlox Family



Sweet-william Phlox
*Phlox maculata* L.
Phlox Family



Alfalfa
*Medicago sativa* L.
Pea Family

© N. G. M., 1923

of the most versatile flower families in the world. This family embraces some 1,500 species, as diverse in appearance, habit, and quality as the Venuscomb and the waterpennywort; the sweetcicely and the button-snakeroot, the water-hemlock and the caraway, the coriander and the dill; celery and fennel; the plant from which we get asafetida and that which gives us anise.

This plant grows from 1 to 3 feet in height. It is a very common perennial which frequents the roadside throughout its territory. Collecting in many small clusters, the tiny flowers carry out the department-store type of advertising characteristic of the composite family, whose members include the goldenrods, the asters, the sunflowers, and the thistles. The stamens are prominent and the species of insects numerous. Many species of two-winged flies and small butterflies are regular guests at the golden meadow-parsnip's table, but only a few bees are attracted by its offerings.

## EUROPEAN BARBERRY

**Berberis vulgaris** L. Barberry Family
[Plate V, left]

The European barberry has been naturalized from Europe in the Eastern and Middle States and from there has spread to Canada and the West. It consists of numerous races and is variously known as the pepperidge-bush, the jaundice-berry, and wood-sour. Blossoming in May and June and bearing fruit in September, it grows from 5 to 8 feet high. Its preferred habitat is thickets and roadsides.

Though the flowers are small, they are decidedly resourceful in insuring themselves the full service of their insect visitors in securing cross-fertilization. In one respect the arrangement of the stamens and pistil suggests that of the mountain-laurel, but the stamens are not held back by little springs like those of the laurel. Those of the latter plant catapult their pollen onto their visitors, while those of the European barberry are endowed with life and motion and are able to move like the leaflets of a sensitive-plant. If the base of the filament be touched on the inside with a pin, the stamen promptly shrinks and draws in toward the pistil in much the same way as the sea anemone closes its tentacles when touched.

When a bee visits one of the new-blown flowers, it finds the six little stamens resting wide apart, against the several petals. Thrusting its tongue into the nectar gland, the bee touches several of the stamens, whose pollen chambers are open and ready to scatter their contents. As the stamens draw in they dust the head of the bee, which carries this pollen dust to the next flower it visits.

## YELLOW WOODSORREL

**Xanthoxalis cymosa** Small. Sorrel Family
[Plate V, middle]

The yellow woodsorrel flourishes in fields, thickets, and woods from Ontario and Michigan to Florida and Texas and is a native American plant. Its flowering season ranges from May to October.

Growing from 6 inches to 4 feet high, and frequently reclining on its surrounding vegetation, it belongs to a rather small family, most of whose members are tropical, but so closely related to the geranium family that many botanists group it therewith. The cloverlike leaves "sleep" at night or in cloudy weather and the seeds are projected considerable distances when the capsular fruit bursts open. The family gets its technical name from the sourness of the sap of its members, which is a quality arising from the oxalic acid stored therein. Cross-fertilization is accomplished through the agency of small bees and beelike flies.

Some of the woodsorrels familiar in eastern America, like *Oxalis acetosella*, are natives also of Europe and Asia and appear frequently in the paintings of Fra Angelico and Sandro Botticelli. Other species, like *Oxalis violacea*, are endemic to the New World.

## AMERICAN BITTERSWEET

**Celastrus scandens** L. Stafftree Family
[Plate V, right]

Flourishing in rich soil from Quebec to North Carolina, and from Manitoba to New Mexico, the American bittersweet prefers situations along the base of the mountains. It is variously known as the fever-twig, false bittersweet, Roxbury waxwork, and climbing orangeroot. The flowers, appearing in June, are tiny and insignificant. They are scentless, but have many small bees and beelike fly visitors.

The berries, appearing in September, just ahead of the frost, are in reality capsules, which divide into three parts, each part curling backward and exposing the scarlet aril within. The enticing color of the berries and their sharp flavor are good advertisements to hungry birds, which, eating them with gusto, carry their seeds many miles, and thus become agents in the starting of new colonies.

This woody, vinelike shrub grows to a height of 6 to 25 feet, climbing over trees and rocks, and furnishing a rich contribution to the riot of autumn colors.

## SNOW-ON-THE-MOUNTAIN

**Dichrophyllum marginatum** (Pursh) Kl. & Garcke. Spurge Family [Plate VI, left]

The spurge family, to which the snow-on-the-mountain belongs, is a vast one, made up of some 4,000 species, subdivided into some 200 genera.

The snow-on-the-mountain ranges from Minnesota to Colorado, in dry soil. It has been introduced into the Central and Atlantic States, where it thrives in waste places, from May to October, growing to a height of 3 feet.

The closest relatives are the seaside spurge, the milkpurslane, the copperleaf, the wartweed, and the moleplant, the last two having been introduced from Europe. More distant relatives include the tread-softly or spurge-nettle, the

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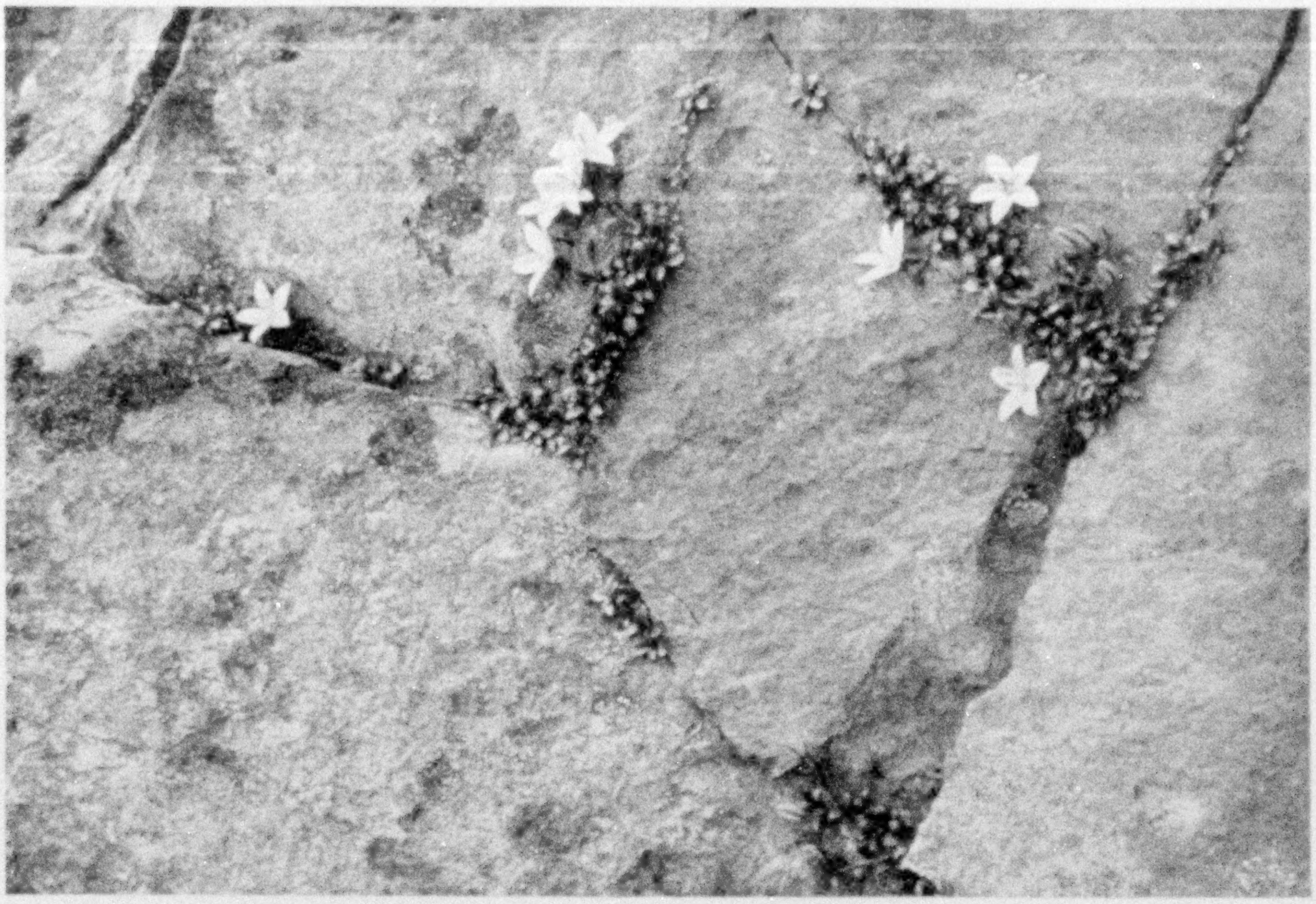


Photograph by Curtis and Miller

A RARE HAREBELL FOUND ONLY IN THE OLYMPIC MOUNTAINS OF THE STATE OF WASHINGTON

Seeking out every little cranny and crevice in the rocks, plants often aid in their disintegration by their power to extract minerals even from stone.

croton-oil plant, the castor-bean and the candlenut.

Most of the spurge family favor a tropical habitat. Nearly every member of the family has an acrid juice, usually poisonous, but sometimes rendered bland by heating. Manioc starch comes from one species. From another is produced the highest-grade rubber that South America exports.

## BLACKBERRY-LILY

**Gemmingia chinensis** (L.) Kuntze. Iris Family [Plate VI, middle]

The blackberry-lily is an imported flower which, escaping from flower gardens, has been able to fight its own battles and settle down to an independent existence on hills and along roadsides from Connecticut to Georgia and westward to Kansas. Its flowering season occurs in June and July, and it gets its name from the appearance of its fruit, which ripens from July to September. In some quarters it is called the leopard-flower.

Like many another flower that is a lily to the layman, this one does not belong to the lily family at all, but rather to the Iris family. It is truly an oriental, having come to the Occident from China.

The Iris family is a far-flung one. The most popular member, of course, is the French fleur-de-lis. Other members include the blueflags, the yellow Iris, and the dwarf Iris.

## SMALL BINDWEED

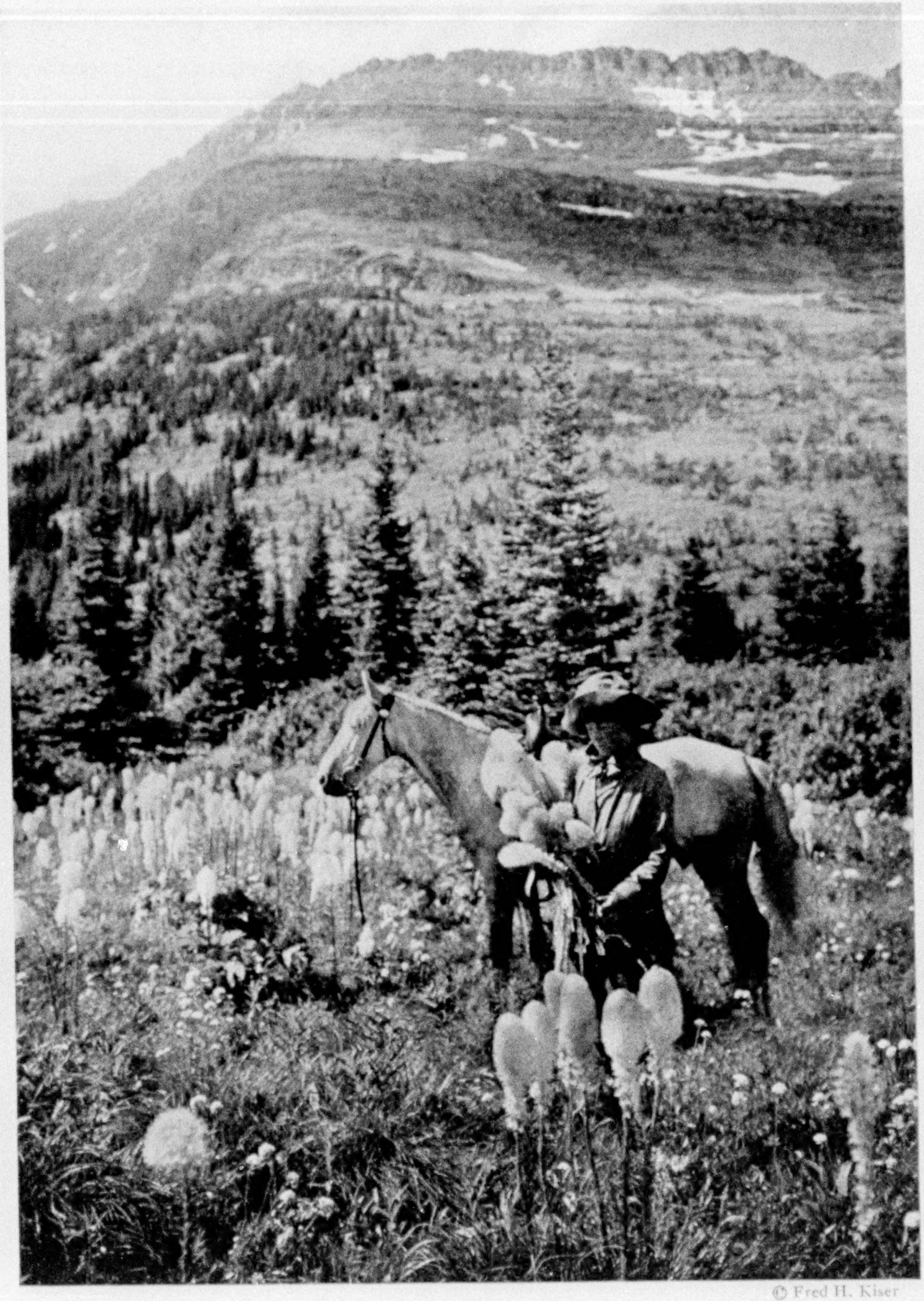
**Convolvulus arvensis** L. Morning-glory Family [Plate VI, right]

Fields and waste places from Nova Scotia to New Jersey and thence across the United States to California are the favorite haunts of the small bindweed. It seems to have originally come out of Asia, moving thence to western Europe and then "beating its way" across the Atlantic in earth ballast or in packing grass. Among its aliases are the following: hedge-bells, bearbind, cornlily, withwind, bellbine, cornbind, sheepbine, and lap-love.

The family to which this plant belongs embraces about 1,000 species. Jalap and scammony come from two of them. The common sweet potato is the tuber of another. Two other species yield oil of rhodium and a wood powder which is used as a snuff and as an incense. Still another cousin is the common dodder, otherwise known as the love vine.

The flowering season begins in May and ends in September, and the small white or pink-tinged flowers are fragrant. The stigmas and anthers mature at the same time, but self-fertilization is prevented by having the pistils longer than the anthers, the former receiving pollen from a flower previously visited.

The bindweeds, both great and small, are a great nuisance to the farmer. A favorite trick of all of them is to use his stalks of corn as trellises.



© Fred H. Kiser

BEARGRASS IN ONE OF OUR NATIONAL PARKS

The lilies of the field seem not to toil and spin, yet they accomplish a work which makes that achieved by man, with all the noise, bustle, and roar of his factories and commerce, seem small in comparison.

Photograph by Ernest L. Crandall

THE MAYAPPLE (ABOVE) AND THE WILD STONECROP (BELOW) FORM A FOREST CARPET

## WOODBETONY

**Pedicularis canadensis** L. Figwort Family [Plate VII, left]

The woodbetony flowers from April to June from Nova Scotia to Florida and westward to the Rocky Mountains. It has a preference for dry woods and thickets and in Virginia ascends to 3,000 feet elevation.

It belongs to a family that includes nearly 2,700 species, most of them possessing bitter juices and some of them yielding narcotic poisons. Among its cousins are the mulleins, the toadflaxes, the snapdragons, the figworts, the pentstemons, the turtleheads, the monkeyflowers, the hyssops, the foxgloves, the speedwells, the gerardias, the painted-cups, and the yellowrattles.

Vernacular names for the woodbetony include the following: high heat-ale, beefsteakplant, lousewort, and snaffles. It is a slightly hairy species. The four stamens are protected from the rain, or other pollen-destroying agents, by a hooded upper lip. Looking down on the tousled spike, it discloses a ripsaw symmetry. This is enhanced if the flower is plucked and twirled between the thumb and forefinger, the illusion becoming real and amusing. As the pansy reveals the face of an old man or woman, the woodbetony shows the head of a walrus, even to the spikelike projections resembling that animal's tusks. The flowers are so arranged that the bumblebee, their favorite guest, can quickly visit the whole group.

## SWEETFLAG

**Acorus calamus** L. Arum Family [Plate VII, middle]

Though it is a cousin of Jack-in-the-pulpit and the skunkcabbage, the sweetflag or calamus has none of the insect-baiting habits of the former and none of the evil-smelling properties of the latter. Indeed, it has a record as an ingredient of incense that goes far back beyond King Tutankhamen, to times antedating the custom of burning incense by the people of Israel.

It is a cosmopolite, spreading over most parts of the North Temperate Zone and thrives in swamps and along streams. The pungent, though pleasant, flavor of calamus root is known to almost every boy.

The flowering time of the sweetflag occurs in June and July, the tiny, inconspicuous flowers completely covering a tapering, cylindrical spadix, growing out at a sharp angle to the flat stem. If these tiny flowerets be examined under a magnifying glass, it will be found that each one is a perfect little lily that has sacrificed much to live in the crowded community of the spike. Its six petals have been reduced to mere scales, each scale protecting a stamen.

The close crowding of the tiny flowerets has good reason behind it. The plant grows near the water, and hence must depend on tiny gnats, beetles, and other small members of the insect community for fertilization.

But even such teamwork does not suffice, for propagation takes place much oftener through the rootstocks than through the seeds produced

Photograph by Ernest L. Crandall

JACK-IN-THE-PULPIT BEGS ALL WHO VISIT HIS SANCTUARY TO "BE MERCIFUL" TO THE WILD FLOWERS

on the spike. When about half matured, the spike is tender and edible and the interior of the stalk is sweet.

The root of the sweetflag has medicinal properties, and is used, when dried or candied, as a remedy for dyspepsia and as a stimulant and tonic for feeble digestion. It is powdered and used as an insecticide in India and Ceylon, and yields a volatile oil used in the manufacture of perfumery. The Greeks and the Babylonians knew of its properties and employed them both in medicine and in incense.

### COBAEA PENTSTEMON

**Pentstemon cobaea** Nutt. Figwort Family
[Plate VII, right]

This attractive member of the figwort family, which grows to a height of 1 to 2 feet, is essentially a Mississippi Valley resident. In the guise of cultivated flowers, varieties of this species have reversed the usual history of plant migrations and have crossed to Europe, where they are highly regarded.

Most of the species of the genus are western flowers, and only three species are found in the East. Flowering time comes in the late spring and lasts through the early summer, the plants being found mainly in dry, rocky regions, where they impart, when blooming, a peculiarly soft hyacinthlike effect to the landscape.

*Penstemon cobaea* is like most of the other species of the family in having a sterile filament that is bearded, and from this it gets its garden alias, the beardtongue.

### CURLY DOCK

**Rumex crispus** L. Buckwheat Family
[Plate VIII, left]

Like so many other plants that have the cuckoo habit of making others do their work, the curly dock is an undesirable alien stowaway from Europe. It fraternizes with the farmer's crops, and therefore succeeds in forcing him to prepare its bed and scatter its colonies, and has spread well around the world in the North Temperate Zone, invading every region where major cereals are cultivated. It grows from 1 to 3½ feet high, with a flowering season from June to August, and its wavy-margined leaves are replaced by heart-shaped seed-wings. It has been shown to hybridize readily with another species, the bitter dock, *R. obtusifolius.*

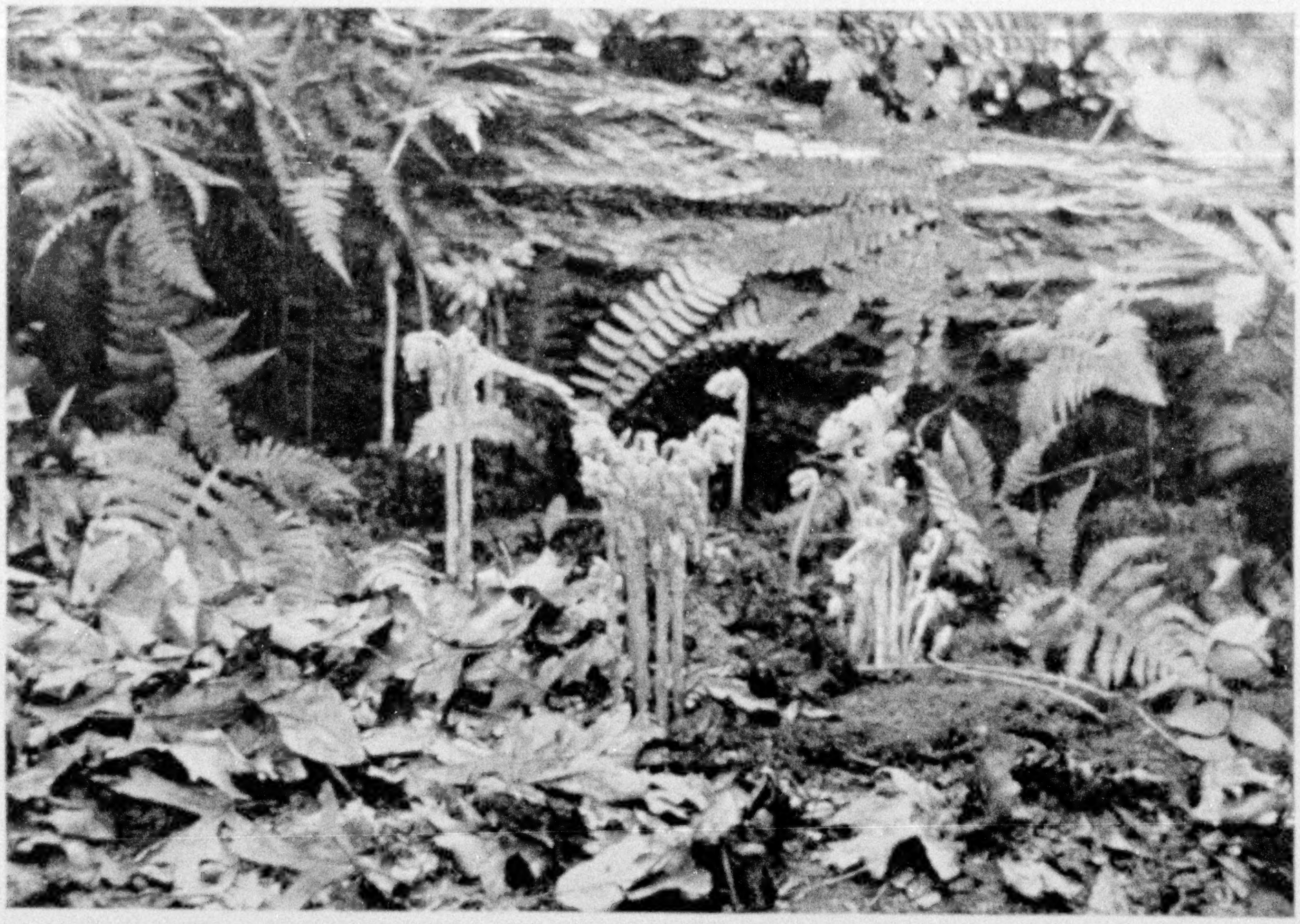
The buckwheat family, to which the curly dock belongs, embraces some 800 species divided into 40 genera.

More distant relatives of the curly dock include the mountain sorrel, the sheep sorrel, the knotweed, the smartweed, the princesfeather, the ladysthumb, the tear-thumbs, and the common buckwheat.

### COMMON SHOOTINGSTAR

**Dodecatheon meadia** L. Primrose Family
[Plate VIII, middle]

Growing from 8 inches to 2 feet high, in open woods, on moist cliffs and upon the broad



© Ernest L. Crandall

PINESAP IN WOODS IN THE ENVIRONS OF WASHINGTON

prairies, the common shootingstar flourishes from Pennsylvania to Manitoba and Texas. It flowers in April and May, its five stamens being united in a cone and its one pistil protruding beyond the cone.

Its name comes from *dodeka* (twelve) and *theos* (god). Linnæus imagined he saw in the flowers of its umbel a little congress of divinities seated around a miniature Olympus.

Each flower is so designed that the bee, clinging to it while sucking nectar, receives on its belly the pollen jarred out of the ends of the cone.

Indian-chief, roosterhead, Johnny-jump, and pride-of-Ohio are some of the vernacular names of the shootingstar. The family to which it belongs is a diverse one, including the birds-eye primrose, the featherfoil, the pimpernels, and the loosestrifes.

## BLACK SWALLOW-WORT

**Cynanchum nigrum** (L.) Pers. Milkweed Family [Plate VIII, right]

The black swallow-wort is a garden plant introduced from Europe which has made its escape from formal society and established itself in various sections of North America as remote from one another as Massachusetts, British Columbia, Pennsylvania, and Ohio. It prefers waste places and blooms from June to September.

The family to which the black swallow-wort belongs is cosmopolitan. It consists of more than 200 genera and over 2,000 species. Most of its members have milky juices and many of them climbing habits. They differ both as to their characteristics and uses. Some are delightfully fragrant, while others are utterly evil-smelling. Some species yield fine fibers and others have medicinal properties. Some are highly ornamental. Among the familiar cousins of the black swallow-wort are the butterfly-weed, the swamp milkweed, and the angle-pod.

The winged seeds of the various members of the family make them rivals of the thistles as colonizers. They were employers of lighter-than-air conveyances ages before Montgolfier dreamed of the balloon.

## COMMON MOONSEED

**Menispermum canadense** L. Moonseed Family [Plate IX, left]

Blooming in June and July and maturing its fruit in September, the common moonseed is a climbing vine that ranges from western Quebec and Manitoba to Georgia and Arkansas. It bears bunches of bluish-black berries which resemble small grapes. Most flowering plants have blossoms with pistils and stamens in the same flower. But the common moonseed has flowers that are pistillate and others that are staminate, and bears them on different plants, so that with representatives of this species there are not only distinctly male and female flowers, but even male and female plants.

The common moonseed is a rank grower and

XUM

Photograph by Sumner W. Matteson

FLOWERS BY THE ROADSIDE, WITH SUGAR LOAF ROCK IN THE BACKGROUND, MACKINAC ISLAND, MICHIGAN

Although the flowers are prodigal in their offerings of brilliancy, fragrance, and sweetness, when they need the insects they never throw open the doors until the banquet is ready to begin. They offer their gifts only when they are ready to profit by the insects' coming (see page 589).

XUM

U. S. National Park Service Photograph

PICKING FLOWERS ON TOP OF THE TRIPLE DIVIDE, GLACIER NATIONAL PARK

The individual plant is the counterpart of a teeming city—its millions of cells, the houses; their microscopic inhabitants, the populace. Sugar refineries, starch factories, milkshops, perfumers' laboratories, and dyestuff establishments are all in operation (see pages 597, 599, and 601).

U. S. Forest Service Photograph

RHODODENDRONS FORM A SETTING FOR A SMALL CASCADE: PISGAH NATIONAL FOREST, NORTH CAROLINA

The triggerlike device in the stamens of the mountain-laurel, by which they are held until a bumblebee releases them and gets dusted with pollen in so doing, is but one of a thousand devices used by plants to make the insects serve them.

Photograph by Ernest L. Crandall

EVEN A DECAYING TREE GIVES LODGMENT TO PLANTS: PLUMMERS ISLAND, MARYLAND

Wild blue phlox (center) and wood chickweed find "good ground" in a rotten place in a tree.

climbs over thickets along the stream banks which constitute its habitat, often strangling other vegetation by its persistent effort to monopolize the sunlight in its vicinity.

## PURPLE CONEFLOWER

**Echinacea purpurea** (L.) Moench. Aster Family [Plate IX, middle]

Whether the purple coneflower belongs to the aster, the thistle, or the composite family depends on what authority is consulted. Some botanists make a very large family and group the sunflower, the thistles, the asters, and the goldenrods together. Gray follows that practice. Britton and Brown subdivide the family and put the purple coneflowers with the thistles. Still others further subdivide the group and cast the coneflower's lot with the asters.

The purple coneflower, growing from 2 to 5 feet high, flourishes in moist, rich soil from Pennsylvania and Michigan to Georgia, Arkansas, and Louisiana. Its flowering season is from July to October. In some sections it is known as the red sunflower and elsewhere as the black sampson.

## CANADA WILDGINGER

**Asarum canadense** L. Birthwort Family [Plate IX, right]

Variously known as the Canada snakeroot, false coltsfoot, colicroot, etc., the Canada wildginger has a range that extends from New Brunswick and Manitoba to North Carolina and Kansas. Its flowering season is April and May, and its flower is a dull, solitary, purplish brown blossom on the outside and creamy white within, which seldom raises its head above the ground, and usually hides among the dead leaves that carpet the floor of the forest.

The lowly position the flower assumes is not a matter of madness without method. Bees and butterflies sleep too late in the spring to serve it in its early adventures. But the fungus gnats and the flesh flies are early on the job, and as soon as they begin to come out of their pupal cases under dead leaves and beneath the bark of decaying trees, the wildginger's flower is close at hand, down in the débris, where there is at once a pleasing haven from cold winds and an abundant supply of pollen for food.

## BRANCHING BUR-REED

**Sparganium androcladum** (Engelm.) Morong. Bur-reed Family [Plate X, left]

Swamps and shallow waters are the branching bur-reed's haunts, and its range reaches from Newfoundland to Minnesota and southward to Florida and Louisiana. The flowering season is from June to August.

The family, as a whole, has flowers arranged like those of the cattail family, but collected in separate spherical heads. They are

XUM

Photograph by Harry F. Blanchard

SMILES OF YOUTH AND FLOWERS OF SUMMER

largely self-fertilizing, but aquatic insects and flies render them some assistance in their task of setting seed.

There are 21 principal species of the bur-reed family found in America besides the one illustrated.

## GOLDMOSS

**Sedum acre L.** Orpine Family [Plate X, middle]

Goldmoss is one of those flowers that, growing weary of the coddling of the flower garden, has listened to the call of the wild and gone out to find its own place in the sun. It still prefers, however, to gladden the haunts of men and is usually found along roadsides and on rocks. It came to America as a desirable alien from Europe, and has spread its colonies from Nova Scotia to Ontario and as far south as Virginia. It has many aliases, such as bird's-bread, creeping Charlie, gold-chain, tangle-tail, poor-man's pepper, treasurer-of-love, and love-entangled, which give some idea of how it has entwined itself into the folklore of the country. An old English name was "Welcome-home-husband-though-ever-so-drunk."

The goldmoss belongs to a family which embraces some 600 species, divided into 30 genera. They are of cosmopolitan distribution, though more strongly developed in South Africa than elsewhere. Australia and South America have only a few species representing the family.

In keeping with its life in dry situations, the bulk of the tissue is succulent, forming a water-store that is protected from evaporation by a thick skin.

## LIZARDTAIL

**Saururus cernuus L.** Lizardtail Family [Plate X, right]

The lizardtail is an attractive flower. It possesses a fragrant odor and is found in shallow water and marshes from southern New England to Florida and westward to southern Ontario and Texas. It flowers from June to August, and has a slender stem. It is known also as the swamplily and the breastweed.

Growing where bumblebees and butterflies are less numerous and where flies abound in great numbers, the lizardtail suppresses the showy petal and substitutes the fragrant odor as its main advertising feature, since the flies are guided by odor, whereas the bumblebees and butterflies are attracted more by color. Hence it is that the lizardtail's flowers are minute and massed, so that the buzzing flies may the more readily communicate the pollen from one to another.

The lizardtail family is notable for its exclusiveness, there being in all North America and Asia only four species belonging to it.

## LOW POPPY-MALLOW

**Callirhoe involucrata** (T. & G.) A. Gray. Mallow Family [Plate XI, left]

The subject of this sketch is a midwestern flower whose range extends from Minnesota southward into northern Mexico. Its flowering season is from April to August. Growing

U. S. Reclamation Service Photograph

GATHERING WILD FLOWERS IN ARIZONA

Flowers that depend on the wind and water to act as their messengers are not beautiful like these. Insects may be lured by attractive odors, bright colors, and sweet nectar, but the wind and water give no heed to such allurements. To provide these qualities would be, indeed, "wasting sweetness on the desert air."

in dry ground, it attains a height of 1 to 2 feet.

The mallow family is a large one, including some 900 species. Among these are the cottonweeds, the hollyhocks, rosemallows, etc.

Many of the mallows are immigrants from Europe and Asia and, be it said, not one of them has proved to be an undesirable alien. Among those that have come to America are: the marshmallow, the mucilaginous product of whose root is the original marshmallow of commerce; the cheeses, which get their name from the shape of their seed receptacles; the velvetleaf, which comes from India; the high mallow, and the musk mallow.

There is one species of mallow whose existence in the United States is a matter of mystery. It is known as *Phymosia remota* and is found only on a gravelly island in the Kankakee River. Whether it is the sole survivor of a species brought out of its original geographic situation by glaciers coming down out of the North in remote ages, or whether it reached there by some other mysterious means, is not known. But whatever its origin, *P. remota* still persists and holds its little domain after all its comrades have apparently been blotted from the earth.

## SWEET GALE

**Myrica gale** L. Bayberry Family [Plate XI, middle]

The sweet gale is another plant whose family name depends on what authority one consults.

Not many species have as wide a distribution, and very few a wider one than *Myrica*

Photograph by Ernest L. Crandall

TWINLEAF AND HEPATICA IN CLEFT OF ROCK: BLACK POND, VIRGINIA

The hepatica is one of the leaders of the floral procession as it comes at the approach of spring, putting out its blossoms even before the leaves venture forth. The twinleaf is often found associated with it in the deep woods, where they together soften the surface of many a cliff.

*gale.* It is found in swamps and around ponds and lakes from Newfoundland to Alaska and southward to Virginia and Washington. It also spreads across Asia and Europe. Baybush, meadow fern, sweet willow, golden osier, and bog myrtle are some of its American aliases. It comes into blossom in April and May, and it grows from 1 to 4½ feet in height.

The family consists of some 35 species of wide geographic distribution. Its closest relatives are the shrubs variously known as the bayberries, waxmyrtles, or candleberries. From still another cousin is derived the aromatic liquid known as bay rum.

The sweet gale is a small shrub, with leaves somewhat like those of the willow. It possesses a fragrant odor and a bitter taste and yields an essential oil by distillation. It was formerly used instead of hops in the making of beer in northern Europe. When the catkins are boiled in water they yield a scum resembling beeswax, which has been used in the making of candles. The dried leaves are also used to give a scent to linens.

The word gale in use for this plant, among various north-European races, also appears in the forms gaul, gagel, and gagl.

## CHECKERBLOOM

**Sidalcea malvaeflora** (Moc. & Sesse) A. Gray. Mallow Family [Plate XI, right]

The checkerbloom, which belongs to the mallow family, is a resident of the Pacific slope. California school children sometimes know it as the wild hollyhock. Its habitat is open fields in the valleys and on the plains; sometimes it climbs the hills, but loses size when it essays to live too high. The flowering season is from late April to early June, and the stems grow from 8 inches to 2 feet in length.

## AMERICAN BURNET

**Sanguisorba canadensis** L. Rose Family [Plate XII, left]

The American burnet, which flourishes in low meadows from Newfoundland to Michigan and southward to Georgia, growing from 1 to 6 feet high, blossoms from July to Jack Frost time. It is a member of the cosmopolitan rose family and its cousins are indeed legion, as the family embraces some 1,200

XUM

© Albert Schlechten

FLOWERS THAT ARRIVE BEFORE THE SNOWS DEPART: SPANISH PEAKS, MONTANA

Would you go sight-seeing through a daisy? Then, in fancy, reduce yourself to the size of a molecule of water and take a trip with the author through one. It contains more houses than New York, more workers than London, more factories than Chicago (see text, page 599).

species, divided into 75 genera. Among these cousins might be mentioned the ninebarks, the meadowsweets, the hardhacks, the goatsbeards, the cinquefoils, the strawberries, the agrimonies, the avens, the raspberries, the blackberries, the roses, and, according to Gray, the apples, the plums, and the cherries.

The Latin name of the burnet genus *Sanguisorba* comes from *sanguis* (blood) and *sorbere* (to absorb), and refers to styptic properties employed in the checking of bleeding in folk medicine.

## TRUMPET HONEYSUCKLE

**Lonicera sempervirens** L. Honeysuckle Family [Plate XII, middle]

Occurring both in low grounds and on hillsides over a range that reaches from Canada to the Gulf and from the Atlantic Ocean to the Rocky Mountains, the trumpet honeysuckle flowers from April to September. It is a scentless but beautiful species, much cultivated, twining about every possible support and climbing high. Its most frequent and welcome visitor is the humming bird, though the long-tongued bumblebees and butterflies are well-received guests at its board.

The honeysuckle family is a far-flung one, with some 300 species scattered all over the world. It includes the elders, the viburnums, the horsegentians, the snowberries, and the honeysuckles.

The honeysuckle puts its nectar down deep so that only those who can serve it profitably as pollen carriers may be able to extract the sweets. But the bees—early risers—are astir long before the friends of the honeysuckle have finished their morning nap, and, biting little holes through the tender tissue at the base of the honeysuckle's tube, they drink the stolen sweets with gusto. Then, when the butterfly and the humming bird come to the feast, they find the cupboard bare. The bees have learned the arts of roguery faster than the flower has built up the strength of its defense.

## WITHE-ROD

**Viburnum cassinoides** L. Honeysuckle Family [Plate XII, right]

This fine shrub blossoms in the early summer and its fruit, first pink and then turning dark-blue or blackish, appears in August. It occurs in swamps and wet soil and has a range that extends from Newfoundland to Georgia and from Manitoba to Alabama. The fruit possesses a bloom like that of the huckleberry. Its tough pliable branches make substitutes for wire and twine in tying rural bundles. Poor mountaineers have frequently used the leaves of the withe-rod as a substitute for tea, hence it is sometimes called Appalachian tea.

Close relatives of the withe-rod are the hobblebush, the arrowwood, and the blackhaw. The viburnums cater to such insects as bees and flies, with short honey-probes. They mass their flowers in dense heads, and the flower tubes are very short.

## ROSE POGONIA

**Pogonia ophioglossoides** (L.) Ker. Orchis Family [Plate XIII, left]

This attractive member of a charming family, which grows from 8 to 15 inches high, is found in bogs and wild meadows from Newfoundland to Florida and westward to Minnesota and Texas, and also in Japan. It blossoms in June and July, has fibrous roots, and propagates itself by runners as well as by seeds.

A shy, timid plant, the rose pogonia is no more like the intrusive blue sailor in its choice of haunts than the hermit thrush is like the saucy English sparrow. But its aloofness in the selection of its habitat is not greater than the ardor with which it invites insect guests to its board. The beauty of its dainty pink flowers is no more appealing to the eye of the bee than their fresh raspberry odor to its sense of smell. Doubly invited, the bee readily responds, and finds a splendid landing platform, all fringed and crested in its honor. Pushing first its head and then its body in between the platform and the column overhead, in order to feast upon the cup of nectar beyond, the bee brings its back into contact with the sticky stigma to which any pollen grains brought from another flower adhere.

## SMALL YELLOW LADYSLIPPER

**Cypripedium parviflorum** Salisb. Orchis Family [Plate XIII, middle]

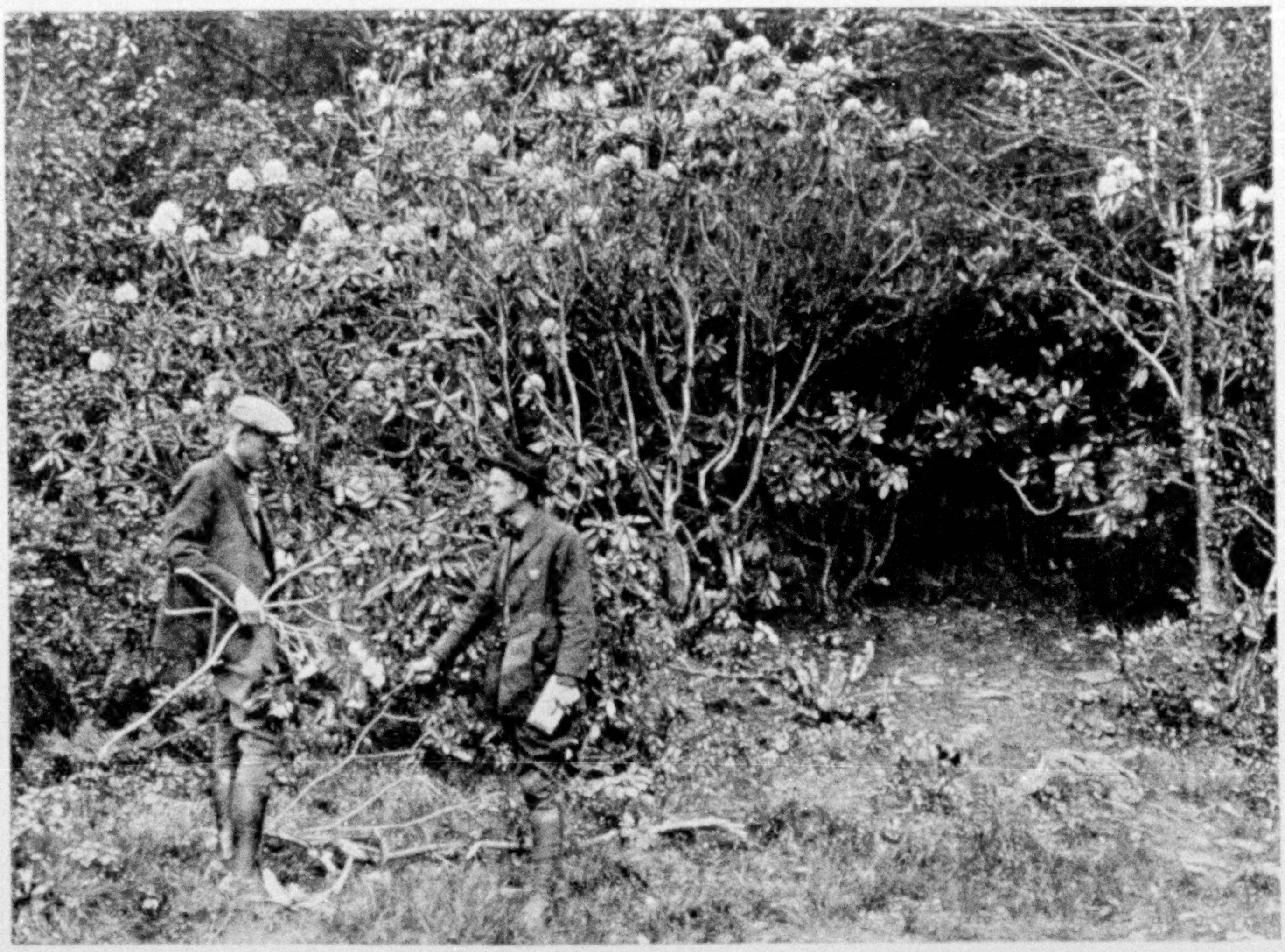
Found in woods and thickets over a range that reaches from Nova Scotia and Ontario to Alabama and Nebraska, this romantic little member of the orchis family flowers from May to July. Some of the romance woven around it may be sensed by recalling some of its vernacular names, such as whippoorwill's shoe, Indian shoe, ducks, and Noah's-ark.

It is practically a miniature edition of the large yellow ladyslipper and has, generally speaking, the same range. But it adds fragrance to its list of attractions.

The orchis family is represented in every part of the tropic and temperate world. Its members have been described as the gypsies of the flower kingdom. There are few families that can vie with this one in diversity, coquetry, and charm. There are some 5,000 species described to date. Not even the grasses can boast of as many known species. Flower lovers esteem the orchids such beautiful creations and are willing to pay such high prices for rare specimens that they have become the most sought-after family now known to botany. Hundreds of hybrid cypripediums are in cultivation. Some of them are of marvelous beauty. The list of cypripediums in Standardized Plant Names, published in December, 1923, covers more than twelve pages. Once the tulips were as popular as the orchids are to-day, and the craze for them came to be known as "tulipomania."

About the only members of the orchis family that have an economic status are the two species that produce vanilla.

XUM



U. S. Forest Service Photograph

REBUKING THE DESPOILER

The forest ranger is here handing the flower vandal an opinion of his act "straight from the shoulder." Unless public sentiment backs him up, our woodlands adjacent to cities will soon be stripped of their springtime beauty.

## ARETHUSA

**Arethusa bulbosa** L. Orchis Family [Plate XIII, right]

The three orchids shown on Plate XIII represent three different genera of the orchis family, with characteristics widely different. Arethusa, known also as Indian pink and dragon's mouth, has a range that extends from the Canadian North to South Carolina and Indiana. It is found in bogs and swamps, growing from 5 to 10 inches high, and blossoming in May and June. Its flowers have a violetlike scent.

Linnæus fancied this flower a maiden in the midst of a spring whence she had gone to find a place where none could follow her. Recalling the legend of Arethusa, the nymph, changed by Diana into a fountain in order to protect her from the infatuation of the river god, Alpheus, who had become desperately in love with her on seeing her at her bath, Linnæus gave the flower the name of the nymph.

This name fits the flower even better than the great botanist dreamed. It has been pursued persistently by the lucre-loving orchid hunters who gather it for European collectors and who are more vigorous and unrelenting in their attentions toward the nymph than was the god.

Catering to the bees and bumblebees in much the same fashion as the small yellow lady-slipper, Arethusa has only one flower to a plant and that often fails to mature seed. Limited in its power of reproduction and pursued by a thousand human foes, it has become rare where once it was plentiful, and it now abounds mainly in places and surroundings that protect it from its enemies.

## TAWNY DAYLILY

**Hemerocallis fulva** L. Lily Family [Plate XIV, left]

The tawny daylily is a native of Europe and Asia which crossed the seas at the bidding of flower-loving Americans, and became popular in the gardens of the East. But generations of coddling at the hands of horticulturists have not served entirely to breed out of it a desire and an ability to shift for itself, so we see it labeled an "escape" in the botanist's manuals. It has gained a foothold from New Brunswick to Virginia and Tennessee, where it flourishes in meadows and along streams, blossoming from June through August, and attaining a stem growth of 3 to 6 feet. It is known in some localities as Eve's-thread, and in others as the lemonlily. It gets its botanical name from the Greek, which proclaims that it is beautiful only for a day. Less attractive as a plant than its more pretentious sister *H. flava*, and odorless, it makes up in the beauty of its tawny flower what it lacks in plant symmetry and fragrance.

The lily family is a large and cosmopolitan one, embracing some 1,300 species distributed over all sections of the globe. The versatility of the family is great. The leek, the garlic, the onion, the tulip, the troutlily, and the hyacinth, all belong to the family. Some authorities expand the family to include the trilliums, the asparagus, the asphodels, and other interesting plants.

## FIELD GARLIC

**Allium vineale** L. Lily Family [Plate XIV, middle]

Of all the undesirable aliens of the plant world that have obtained a foothold on American shores, none takes higher rank in undesirability than the field garlic. It came as a stowaway and has spread rapidly over the eastern part of the United States. It justifies the farmer's assertion that it "seeds at both ends," since it not only bears a whole umbel of seeds and bulblets on its onionlike stem, but a lot of tiny onions at the root. As it gives a garlic flavor to milk and butter it is particularly objectionable in pastures.

From the earliest times garlic (*Allium sativum*), has been a relish with a great many people and anathema to many others. It was eaten by the children of Israel during their stay in Egypt, and furnished to the laborers by Cheops while they were building the great pyramid that bears his name.

## GRAYS LILY

**Lilium grayi** S. Wats. Lily Family [Plate XIV, right]

Grays lily, a typical mountain flower, belongs to the southern Appalachians. It is a scentless member of the family and is closely related to the Canada lily.

Its flowers are somewhat smaller, its color tone is deeper, and its head more often nods. When cultivated it loses its differentiating characteristics and sooner or later shows more of the character of the Canada lily.

## POISON SUMAC

**Toxicodendron vernix** (L.) Kuntze. Sumac Family [Plate XV, left]

All authorities agree that, not even excepting the poison-ivy, this species is the most poisonous of the sumac or cashew clan. It is found in swamps from Maine and southern Ontario southward to the Gulf of Mexico and as far west as Minnesota and Missouri. It blossoms in June and bears its fruit in the late summer. The wood of the poison sumac weighs 27 pounds to the cubic foot and is of a soft texture, yellowish-brown in color.

There are some 500 species of the sumac family, most of them keeping within the warm and tropical regions. Only a few species have had the courage to brave the cold and secure a footing in our latitudes. The leaves and bark of the smooth sumac are gathered and used in tanning in the South. The bark of staghorn sumac is also rich in tannin. The fragrant sumac has a range embracing the region east of the Mississippi and is as sweet-scented as its cousin is poisonous.

## CALIFORNIA RHODODENDRON

**Rhododendron californicum** Hooker. Heath Family [Plate XV, right]

Known also as the California rose bay, the California rhododendron is one of the Pacific coast's most charming flowers. It is the species adopted by the State of Washington as its official flower. A splendid shrub, by many regarded as the handsomest indigenous to the Pacific States, it grows from 3 to 15 feet high and has a grayish trunk. The leaves are from 3 to 10 inches long and are leathery and smooth, but not shiny. The flowers are scentless and the stamens terminate in anthers that resemble tiny serpents' heads.

With richly colored flowers mixed with crimson-tipped buds, and backed by dense green foliage, the shrub gives a striking combination of delicate and brilliant tints, which, met with in such places as the redwood forests, stir the soul of the beholder. California rhododendron belongs to the heath family, of which about 1,100 species have been described.

## CREEPING POLEMONIUM

**Polemonium reptans** L. Phlox Family [Plate XVI, left]

The creeping polemonium is a dainty flower that flourishes in open woods from New York to Georgia and westward to Minnesota and Kansas.

Some of the garden varieties of phloxes have been bred from *Phlox drummondii*, a Texas species. The tall sweet-scented garden phloxes were bred from *Phlox paniculata* and *P. maculata*. Europe, appreciating our wild flowers more than we do, carried representatives of these species across the Atlantic and developed therefrom many beautiful varieties that came back to America to thrill millions of flower lovers.

## SWEET-WILLIAM PHLOX

**Phlox maculata** L. Phlox Family [Plate XVI, middle]

This pleasing member of the phlox family lives along streams and in moist woods east of the Mississippi River and south of Massachusetts. Its flowering season extends from mid-June to late August and it has a stem growth of 1½ to 3 feet. It frequently escapes from cultivation farther north and wanders along dry and dusty roadsides. Hawthorne's little red cottage at Lenox, Massachusetts, lies in ruins, but the white phlox his wife planted

Photograph by T. E. Marr

A LILAC BORDERED DRIVE OF THE ARNOLD ARBORETUM, HARVARD UNIVERSITY

there has not only survived but has spread over the hillside.

In order to defend their sweets against pilferers who could render them no service as pollen carriers, many of the phloxes have coated their upper stems and the base of their flowers with a sticky substance that forms an effective barrier to an approach. Thus the phlox does for itself what men do for the trees in keeping the caterpillars from reaching the branches.

## ALFALFA

**Medicago sativa** L. Pea Family [Plate XVI, right]

While alfalfa is generally known as a forage plant, it has shown some ability to leave the farmer's fields and strike out for itself. It is therefore sometimes encountered as a wild flower between Maine and Virginia, and westward to the Pacific coast, growing from 1 to 1½ feet high and flowering from June to August. Several crops may be harvested on the farms in the course of the summer.

It is a leguminous plant which gathers nitrogen from the air, uses what it needs, and sends the "crumbs," as it were, into the soil. The locust tree belongs to the same family of plants. As these legumes reverse the process of those plants which extract nitrogen from the soil, they are known to the farmer as great promoters of soil fertility. In England, alfalfa is known as lucerne. The name "alfalfa" is of Arabic origin, and means the "best fodder," a verdict rendered by the Arabians and affirmed by American experience.

Alfalfa was introduced into Italy from the eastern Mediterranean countries in the first century, A. D. The Spaniards gave it further vogue in Europe, and finally, about 1650, it was introduced into England. Sometime before that it was brought to Mexico, later to California, and in the middle of the nineteenth century it began to command the favor of American farmers, generally.

Some botanists call the family to which the alfalfa belongs the pea family; others call it the pulse family.

# NORWAY AND THE NORWEGIANS

By Maurice Francis Egan, Litt. D.

*Late United States Minister to Denmark*

Author of "Denmark and the Danes," in the National Geographic Magazine

NORWAY is one of the new nations, although it possesses one of the oldest histories in the world; it did not become independent until the year 1905, through a carefully negotiated separation from Sweden.

It is needless to say that the Swedes were not pleased—they are perhaps, except the Spaniards, the proudest people in the world—and when Norway presumed to cast off the mild rule of King Oscar and become "Norway for the Norwegians," war between Sweden and Norway seemed very near.

The Swedes were ready to mobilize. The officers of the army abroad were called home, but through the good sense of both, assisted by the Norwegian Minister of State, Christian Michelsen, this danger, which would have been a great misfortune for both countries, was averted.

Of the three Scandinavian countries, Norway is the least in population, the Norwegians numbering not quite two million five hundred thousand. In comparison, the population of Sweden is more than double this, and that of Denmark somewhat above it.

### NEW NATION BECOMES A MONARCHY

In dealing with the Norwegians one can not help using superlatives, and one need not excuse one's self for saying that they are the most democratic people in the world—that is, the Western world.

If their common sense had not played such a great part in their negotiations for separation from Sweden, they would have become a republic. It was no doubt the influence of the great powers that induced them to retain that monarchical form of government which had been historic with them.

The Norwegians are very modern in their point of view; they have put in force the methods of a conservative socialism, and they do not hesitate to adopt any progressive idea which seems to fit in with their civilization.

Foreigners sometimes call them obstinate, but they look on themselves as merely firm. They are fixed in their opinions, but they do not attempt to force their opinions on other people.

And, whether it is the influence of their great coastline, of their splendid fjords, or of their love of the sea—there is a strange reflection of the color of the sea in the eyes of the Norwegians—they are open-minded and far from insular.

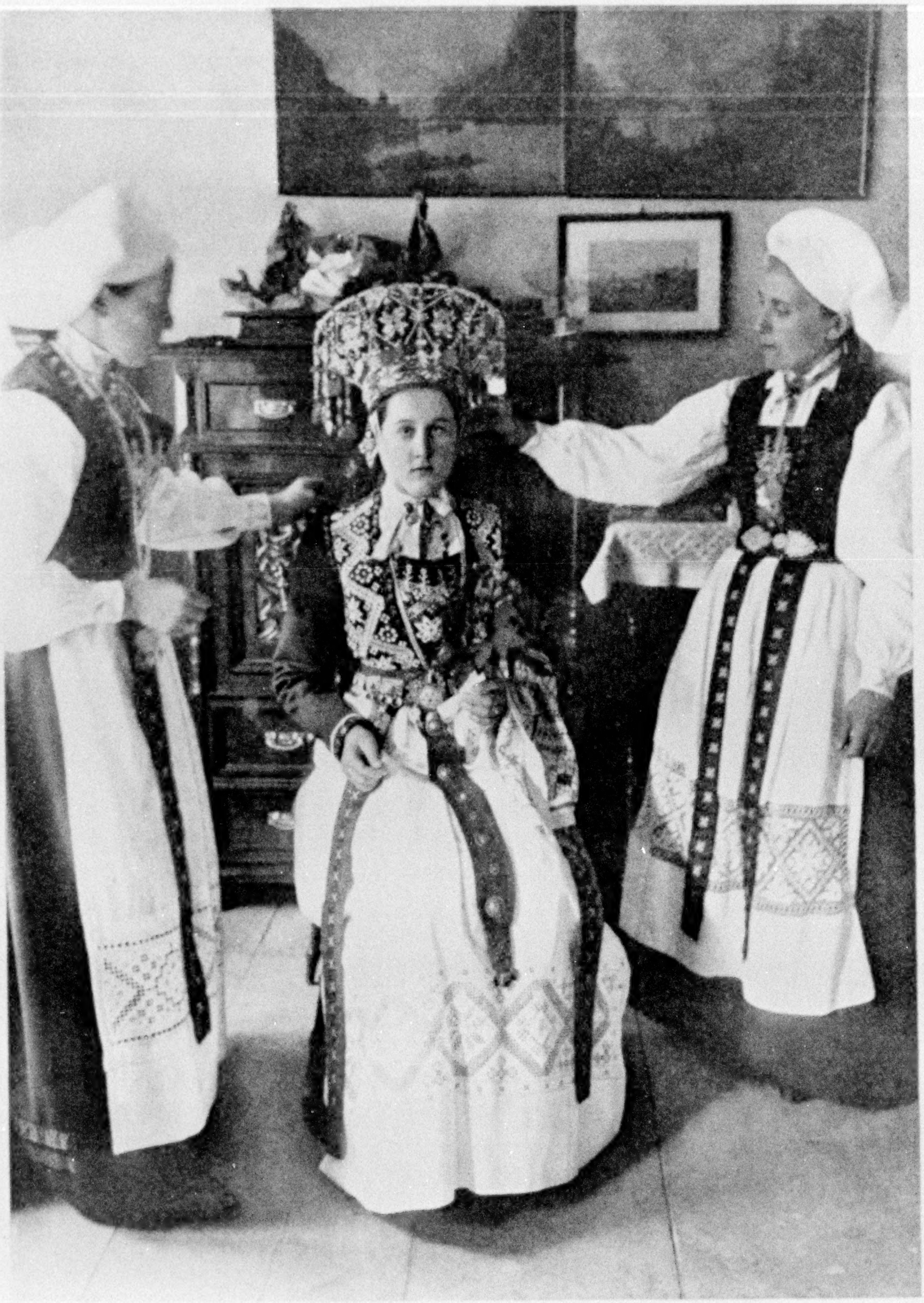
### THE NORWEGIANS CHOOSE A DEMOCRATIC KING

In choosing a king they were largely guided by their own principles. Having a state church, the Lutheran, by law established—though most of them regard a state church as an anomaly—they must choose a Lutheran king and one with extreme democratic tendencies, and they wanted a queen, too, who would sympathize with their democratic ideas. No German prince need apply.

They chose Prince Karl of Denmark, brother of the present king of that country, and he assumed the title of Haakon VII. His wife, Queen Maud, daughter of King Edward VII of England, was already known to them. She had lived in Copenhagen and been justly respected and admired. It was impossible that a granddaughter of Queen Victoria should not have a proper sense of her own dignity; but this dignity was rather personal than royal.

To see Queen Maud at a court function in the Palace of Christiania, dressed simply and appropriately in her favorite white, is to have a vision of graciousness and to understand why the Norwegians love her, not only because she is the mother of the prospective heir to the throne, Prince Olav, but for herself as well.

Prince Olav has gone to school just like any other well-brought-up Norwegian boy. He is willing to be a prince, because it is expected of him, but he puts on no airs, and he seems—his comrades



Photograph by A. B. Wilse

ARRAYING THE BRIDE IN HER WEDDING FINERY: NORWAY

In remote sections of the country one may still see a real Norwegian wedding. The bride, wearing the native dress of her particular district, rides to the church on a pony which is led by the master of ceremonies. If the pony is strong enough, two or three of her relatives also ride. After the ceremony, there is a dance upon the green, a wedding supper, and general merrymaking, which lasts until late at night, only to be continued for the next two or three days.

Photograph by Donald McLeish

FOUR FRIENDS OF THE HALLING VALLEY

say—not to count too much on being King of Norway, although, in spite of their republicanism, the Norwegians look on him as the pledge of a future stable government.

There is no patriotic Norwegian who does not regard his winter sports as the necessities of life; and Prince Olav has been brought up to be a good Norwegian sportsman, in a country where it is rather unpleasant to be too rich and where open-air sports, the cultivation of the mind, and acute interest in literary and scientific pursuits mean much more than the piling up of money.

It is unpleasant to be rich, because the government, in its energetic economic capacity, makes the life of a rich man a burden, by tremendous taxation. Sometimes in Norway one can begin to understand the meaning of the Oriental legend in which the only happy man appears to be the one who possesses nothing but a shirt.

### A HANDSOME SAILOR KING

The King and Queen live alternately, without ostentation of any kind, in their palace in Christiania and in their country house on the peninsula of Bygdö, a short distance from Christiania. The only luxurious thing about them is a splendid white bearskin used as a sleigh robe when they drive through the streets of Christiania.

King Haakon is a remarkably handsome man. He had been a sailor in his youth, brought up with a stern sense of

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BRIGHT FACES LOOKING OUT FROM AN OLD VIKING BALCONY

The Viking ancestors of these pretty Norwegian lassies, with great daring, pushed their high-prowed boats across the unknown Atlantic to Iceland in 861, to Greenland in 982, and to the North American coast in the vicinity of Newfoundland and Labrador, and probably as far south as the New England coast, between the years 985 and 1011.

duty, a knowledge of economics, and a great sympathy with the progress of peoples. He speaks well, briefly to the point, and he possesses a melodious voice; but probably no other man, not even another sailor, hates to speak in public more than he does.

I remember on one occasion sitting near him at dinner. "The King eats little," I could not help remarking to the lady in waiting next to me, "and yet he does not look ill."

"The King," she answered with a smile, "is neglecting his favorite dish, which is roast chicken, because he is expected to make a speech, and that is the one horror which can make a good Scandinavian like him neglect his food!"

### "A CONSTITUTIONAL PRESIDENT FOR LIFE"

Speaking of democracy, work is not looked on as menial in Norway. I recall the incident of an American woman, visiting Christiania, who, having been invited to a court ball, went to a hairdresser's. The *coiffeuse* was very amiable, well bred, and efficient. Nevertheless, the guest was astonished when she saw in the ballroom this *coiffeuse* leaning on the arm of her husband, a lieutenant in the army. This was not regarded as in any way remarkable in democratic society.

"I am afraid," the King of Norway once said to me, "that you Americans look on us as almost too democratic; in fact," he added, smiling, "your President is a king for four years, while I am a very constitutional president for life."

Now, many persons in our country who are not at all conservative may be rather amazed by the incident of the hairdresser appearing at the ball and by her taking the proper rank; but it must be remembered that occupation, in Norway, does not imply ill breeding, coarseness, or a lack of knowledge of the finer things of life. It is very probable that this woman, who helped to eke out the small salary of her husband, without loss of dignity, spent a month each winter on the Riviera or in Italy or in Paris. She and her husband probably lived in what would be considered rather cheap lodgings—in what the French call *hôtels des nobles ruinés*—but that would not prevent them from enjoying the best things which Italy or France has to offer.

Norway is one of the few countries in which luxury is not regarded as a necessity of civilized life. I recall, with amusement, the astonishment excited in university circles when an American professor appeared with a splendidly dressed wife, a Rolls-Royce car, a valet, and a maid. By reason of his splendid appurtenances, his reputation as a scholar was almost ruined, in the eyes of the Norwegians and the Danes, who associated high thought with simple living.

I remember the impression made on my mind by one of the gentlemen connected with the University of Christiania, when I stopped at the hotel to leave a card for this eminent American scholar just after he had arrived. The Norwegian teacher, who had seen him drive up in his limousine, asked me who he was. I told him. "It's impossible; he can't be a professor!" was the comment.

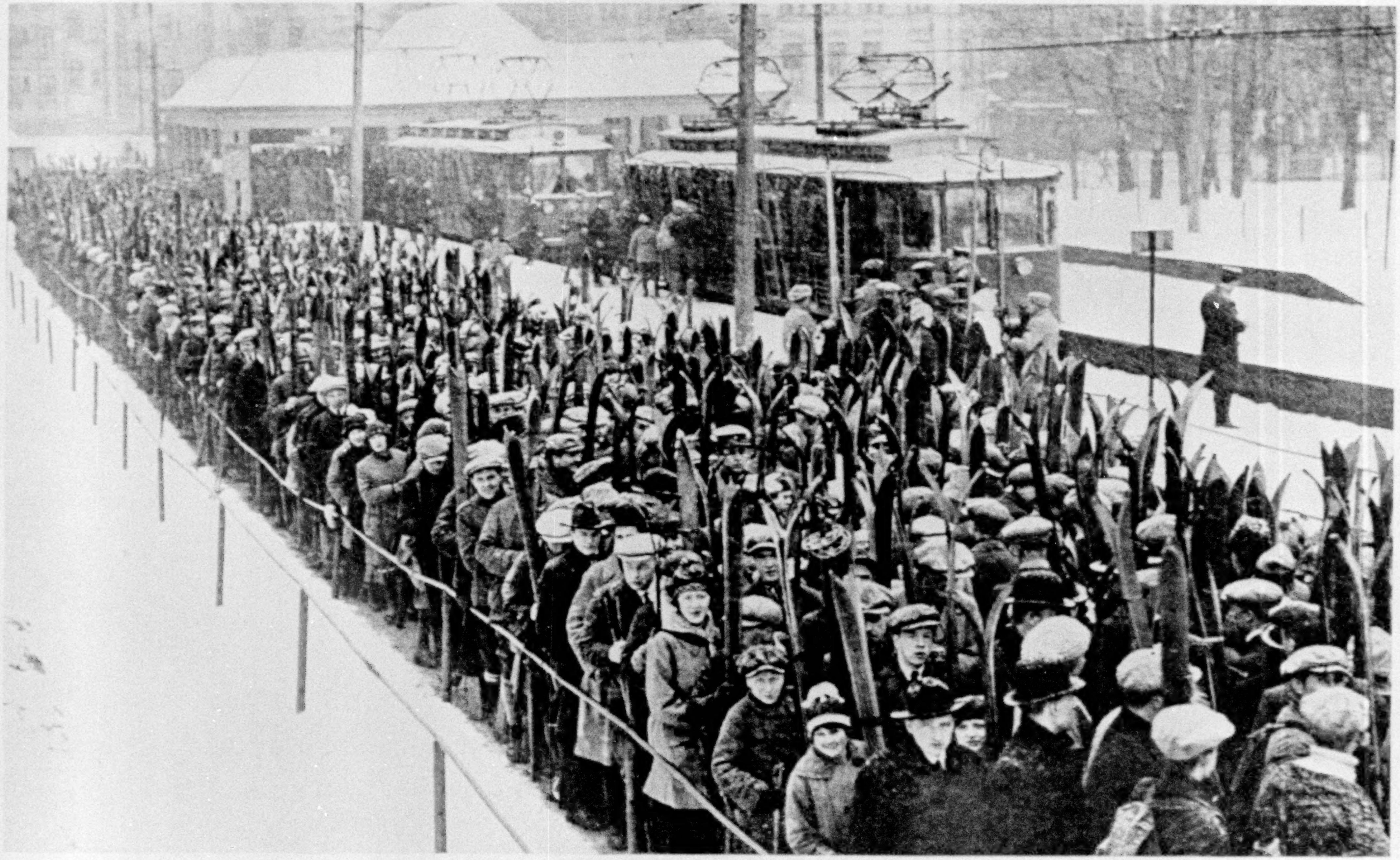
The impression has gone abroad that because Norwegians are frugal their country is impecunious. This is not true. A small country which can afford to devote each year to the church, to the schools, to the encouragement of science and art about two million dollars can not be said to be either miserly, mercenary, or very poor.

### NORWAY'S LANGUAGE TANGLE

There is one thing which the Norwegians have not yet learned, although Björnstjerne Björnson, with all his authority, tried to teach it to them—that the multiplication of languages is a bad thing in any country, since it adds to the difficulties of the working as well as the business man.

The literary Norwegian language, as written and spoken, resembles Danish very closely, although the inflections and intonations in speaking are different. Well-spoken Norwegian is almost a harmonious chant; but, no matter how well the Norwegian may speak his own language, it takes him a long time to learn English well, and a longer time if he must disentangle himself from the composite language called *maal*, which certain patriots are doing their best to make general in Norway.

The *maal* is not really a dialect of the peasants; it enshrines no folklore. It is, as a learned professor says, a kind of



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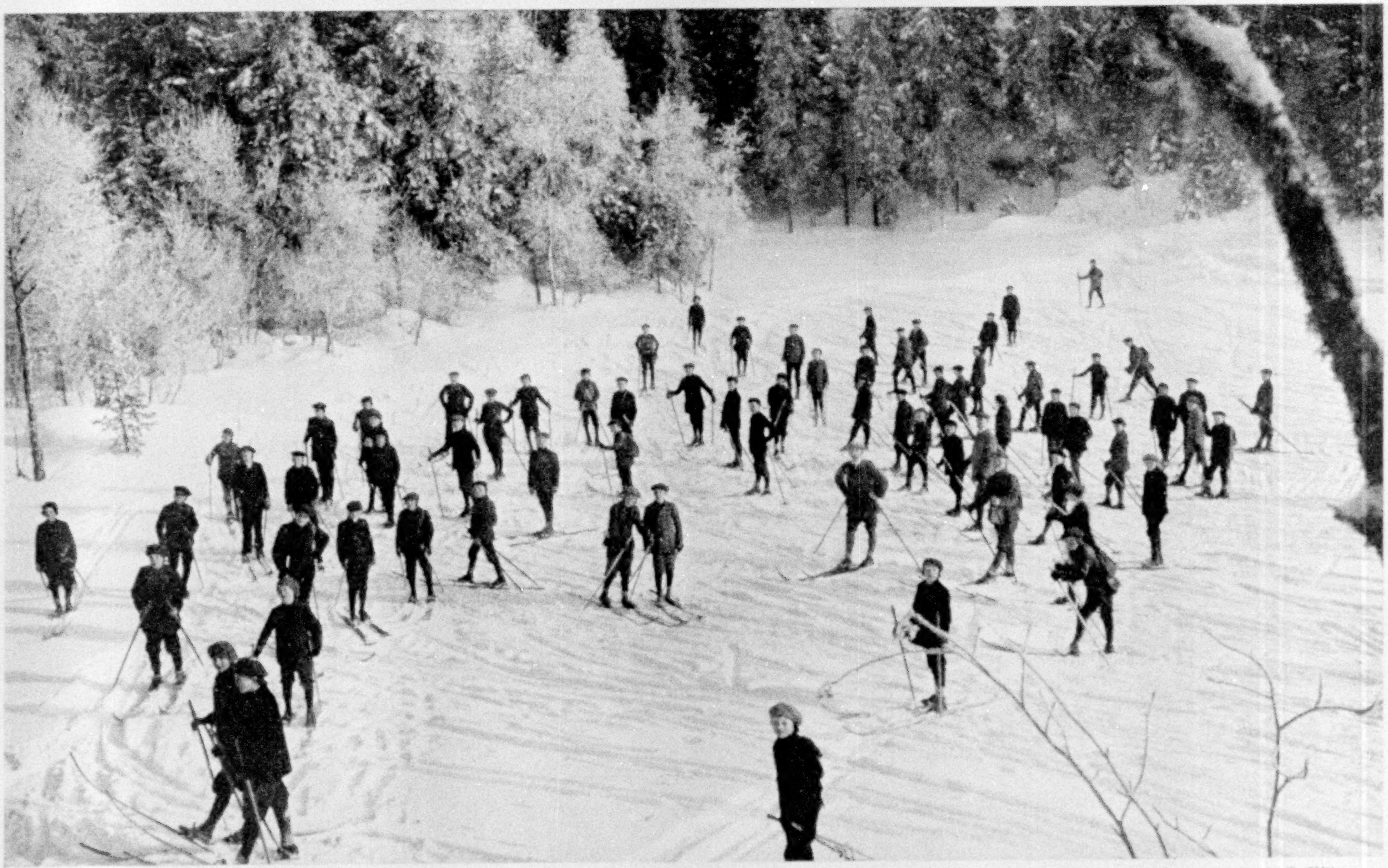
A BIRNAM WOOD OF A THOUSAND SKIS

This crowd is waiting at a Christiania railway station to board the train for Finse, the highest point on the Christiania-Bergen Railroad. The annual ski meet at Holmenkollen is one of the principal events of the sporting world in Norway, and is watched by thousands of spectators. The origin of the sport is unknown, but records going back 600 years before the Christian era speak of people who run on the ski.



Photograph by A. B. Wilse

THE RECESS HOUR AT A NORWEGIAN BOYS' SCHOOL

Norway has for years been considered an ideal summer playground for tourists, but it also is unrivaled as a resort for winter-sports enthusiasts. The long, gentle mountain slopes are especially suitable for skiing and tobogganing. There is little fog or chill, the air being crisp, dry, and exhilarating.

XUM

© A. B. Wilse

THE SNOWY PEAK OF THE GLITTERTIND

The Jotunheim, a mountainous region of southern Norway, has an area of 950 square miles and contains some of the highest mountains in the Scandinavian Peninsula. The Glittertind, 8,380 feet, is the second highest in this region. The term Jotunheim (Giants' Home) is a reminder of the mountain-dwelling giants of Norse fables.

Esperanto, founded on the ancient dialects, a mosaic carefully put together by skilled philologists and ardent patriots of the Liberal Party.

A one-time premier of Norway was most enthusiastic in his desire to have this speech the common language of Norway. He seemed to forget that it is not languages, but ideals in common that bind men together.

It would be unreasonable for many Americans to disregard English because it is not the inherited tongue of a great number of them, but only an acquired language, in order to go back to the Choctaw, the Iroquois, or to a mixture of the Spanish of New Mexico, the French Canadian, or patois of rural New England, to the German of Wisconsin, and the Celtic of the Irish in America who know their ancient language, or to the Gaelic of the emigrant Scotch Highlander.

Before the war a man who dared to oppose the compulsory introduction of the *landsmaal* would have acquired a host of enemies—the fight for this national language was so ardent. But Björnstjerne Björnson's struggle for the literary language in use had its effect, and now the results of the war have turned the attention of the Norwegians to the tremendous advantages of their country industrially, and, as they become more and more devoted to utility, the desire for an archaic language may disappear.

But this is a matter for the Norwegians themselves to decide; a foreigner has scarcely a right to an opinion on this subject, though he may be excused on the ground that, in order to master Norwegian literature in the future, he may hope not to be expected to learn two languages.

### TWO LITERARY GIANTS OF NORWAY

The critics and the sociologists have several opinions as to the value of the works of those two great Norwegians, Björnstjerne Björnson and Henrik Ibsen, from the literary and ethical points of view. There is no question, however, that Ibsen revolutionized the drama, as to its form, in all civilized countries.

But it is amazing that this country of Norway, the home of robust fishers and seafaring men, who had been brought up to reduce material life to its simplest elements, has produced a group of writers and musicians whose fame is international and must be enduring. One can not mention modern music without thinking of Edward Grieg, of Ole Bull, and of Christian Sinding.

The novel with the thesis flourishes in Norway. The question of sex and the sex relations and their effect on society in general is not so much of an obsession as it is with the newer school of English novelists.

The matter of women's rights is settled in Norway. A woman now, if she can secure the requisite number of votes, is eligible for any office except in the church and in the diplomatic service.

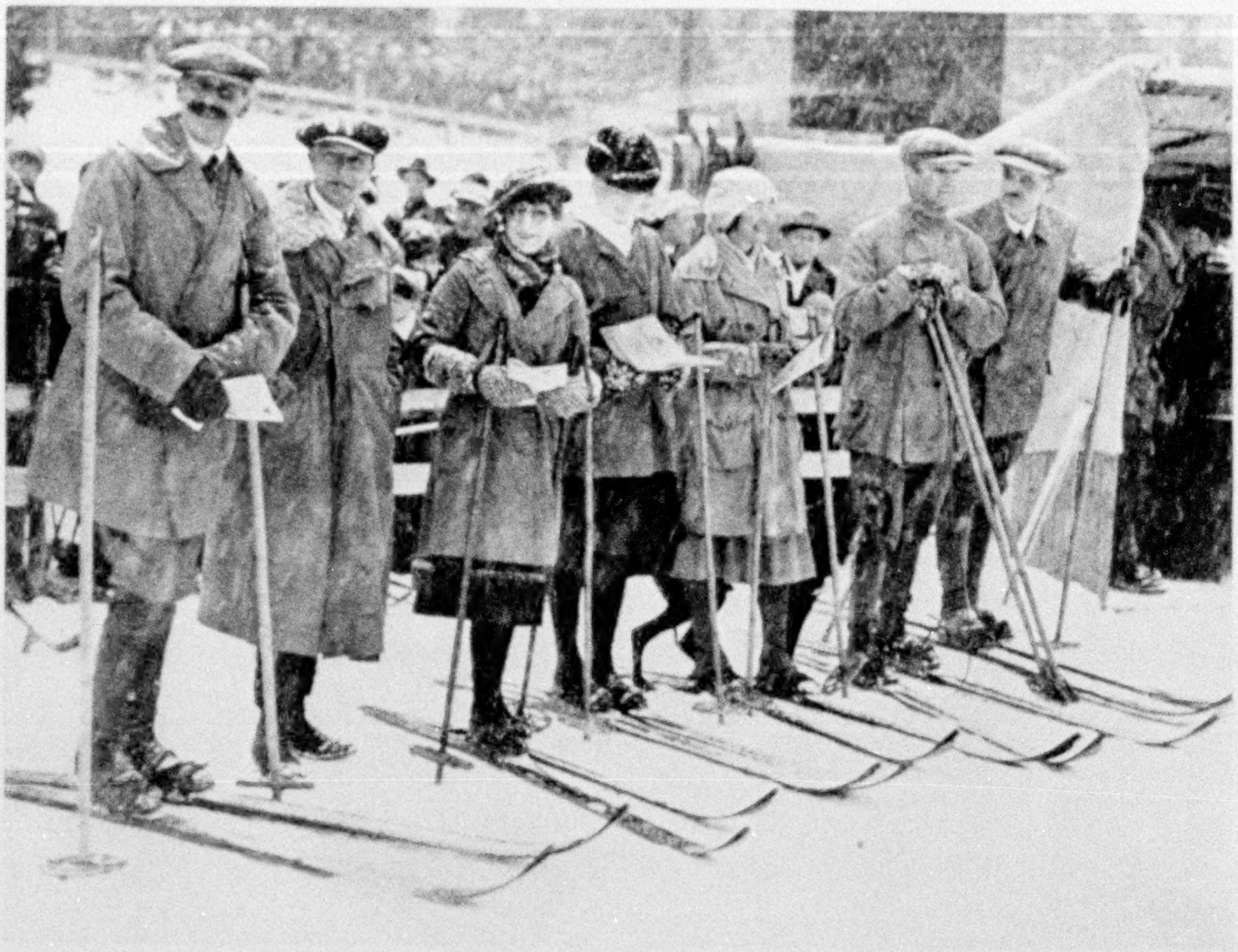
The struggle for women's rights assumed form in Norway when Jacobine Camilla Collett, sister of the romantic poet, Henrik William Wergeland, wrote her novel, "The Governor's Daughters."

Society in Norway, as in nearly every other country, complacently admitted that a different standard of sexual morality existed for women and men. In 1883 Björnson's play, "A Gauntlet," appeared. The chronicles of that time show that in Christiania and in the smaller centers of Norwegian culture a storm was raised over this drama, which tore all social gatherings into factions and made the rival newspapers thunder. Björnson had insisted solemnly that there was only one standard of chastity.

He was taken most seriously, and *prétendants* for the hands of young women were frankly questioned as to their past, which astonished and irritated them extremely. We are told that societies for the preservation and encouragement of sexual morality among the men were formed, and all prospective husbands were put through the test which Björnson's play had suggested.

Whether a reformation in the male sex was made or not, it would be rather impertinent to ask. "A Gauntlet," however, was gradually forgotten as to its thesis and is now occasionally played as one of the Norwegian semiclassics.

Both Sweden and Norway are greatly interested in the Nobel prize, and Björnson was an early recipient of the literary award, in 1903. Roosevelt was on his



Photograph from International

MEMBERS OF THE NORWEGIAN ROYAL FAMILY ARE WINTER-SPORTS ENTHUSIASTS

Skiing may be called the national sport of Norway, for the royal family delights in it and it forms a part of the training of the Norwegian army. Kongssaeteren (literally, "the king's saeter"—see page 668) is a favorite resort in winter for this sport. In the illustration the King of Norway is on the extreme left and the Queen is third from the left.

way to Christiania to make his speech, in the character of a recipient of the Nobel peace prize, when Björnson died, in 1910.

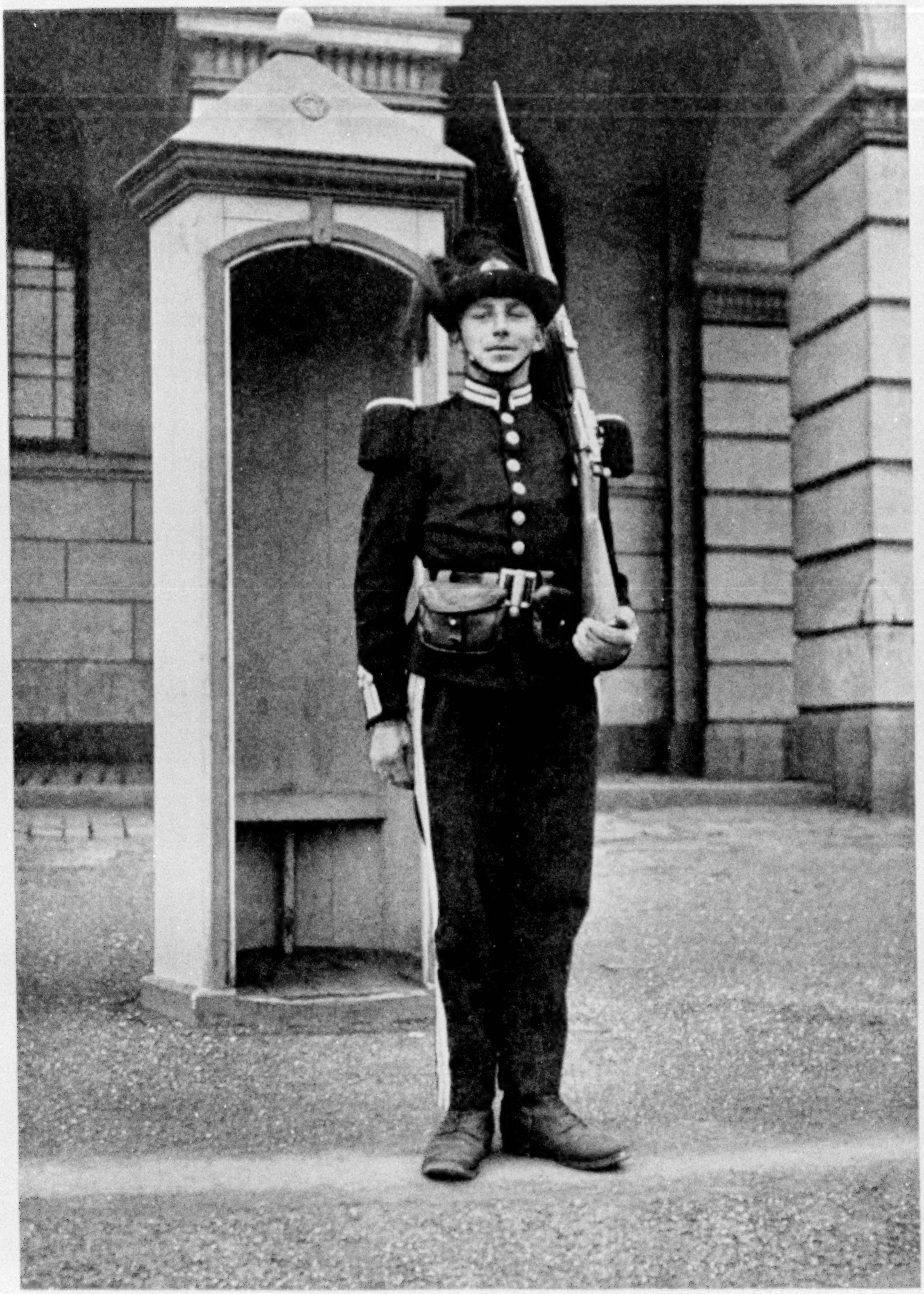
His obsequies were celebrated, both in Christiania and in Copenhagen, with a solemnity befitting the funeral of a great monarch. I remember with what anxiety we in Copenhagen watched the news of his illness. We were most anxious that this giant of letters, who resembled our poet, Walt Whitman, should live as long as possible; and the secondary reason for this was that the popular mourning at his funeral in Christiania might interfere with the splendid reception of ex-President Roosevelt which the Norwegians had prepared.

Björnson was always courteous socially, but nobody expected that he would show the exquisite politeness of dying just in time to give the Norwegians the opportunity of offering a gala to one of the greatest of modern Americans.

It is remarkable that the Scandinavians, who love France and Italy, while they have always had a certain intellectual respect for Germany, but no affection, should have remained so national in spite of the fact that none of them stayed entirely at home. Thorwaldsen, the Danish sculptor, borrowed greatly from Greece and Rome and his next country of preference was Italy.

### WEAVING AND CHINA MANUFACTURE ENCOURAGED

The Norwegians have never lost their love of the arts and crafts of the people. Munthe deserves the credit of having encouraged cordially the art of weaving among the people, and the progress of tapestry making in Norway is marked from year to year. I hope that that institution for the cultivation of the beautiful in textile arts, the Philadelphia School of Design for Women, will some



* Photograph by Donald McLeish

ON GUARD BEFORE THE ROYAL PALACE AT CHRISTIANIA

He is a sentry of the First Company of the King's Guards, the oldest of four companies of royal guards.

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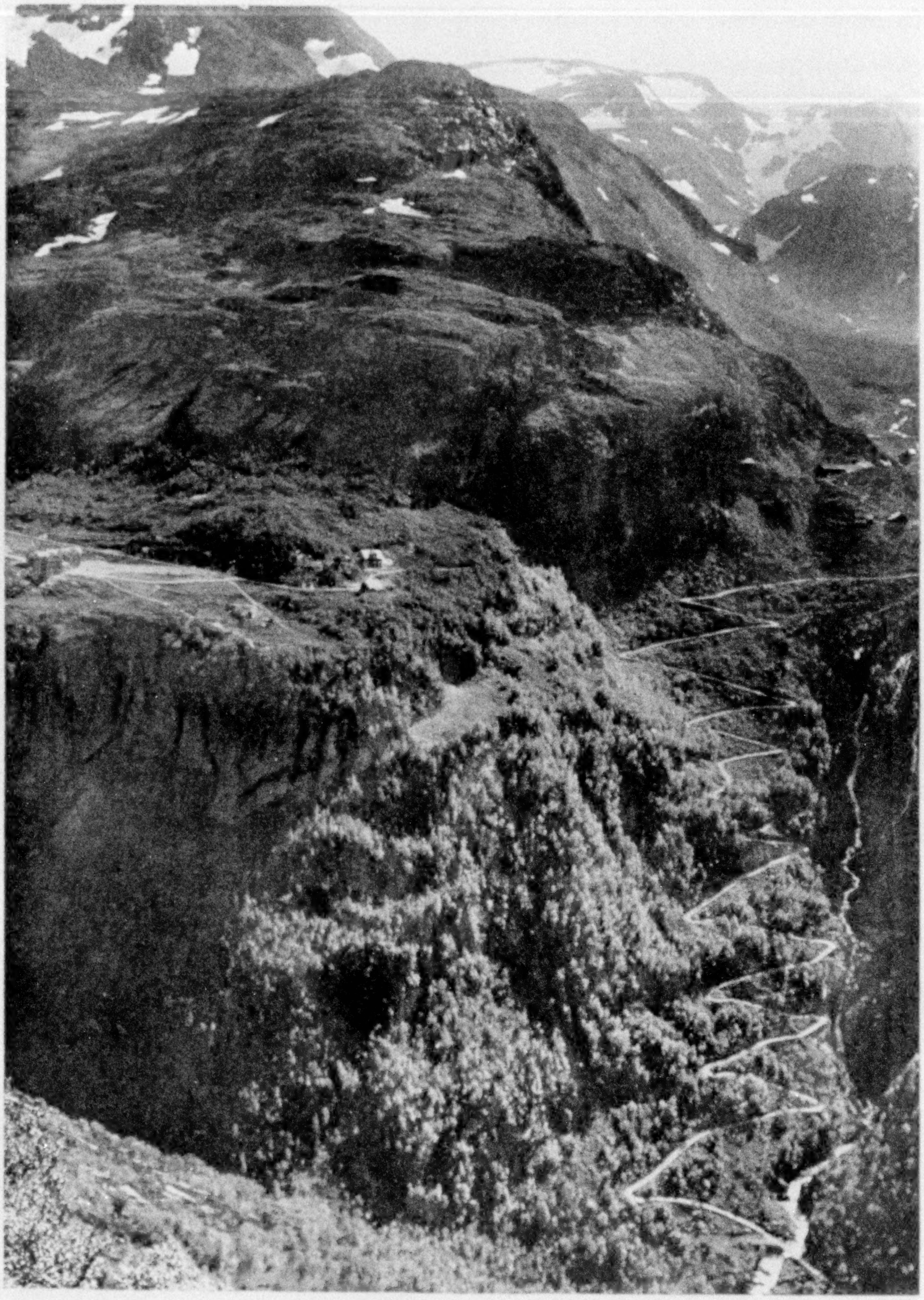
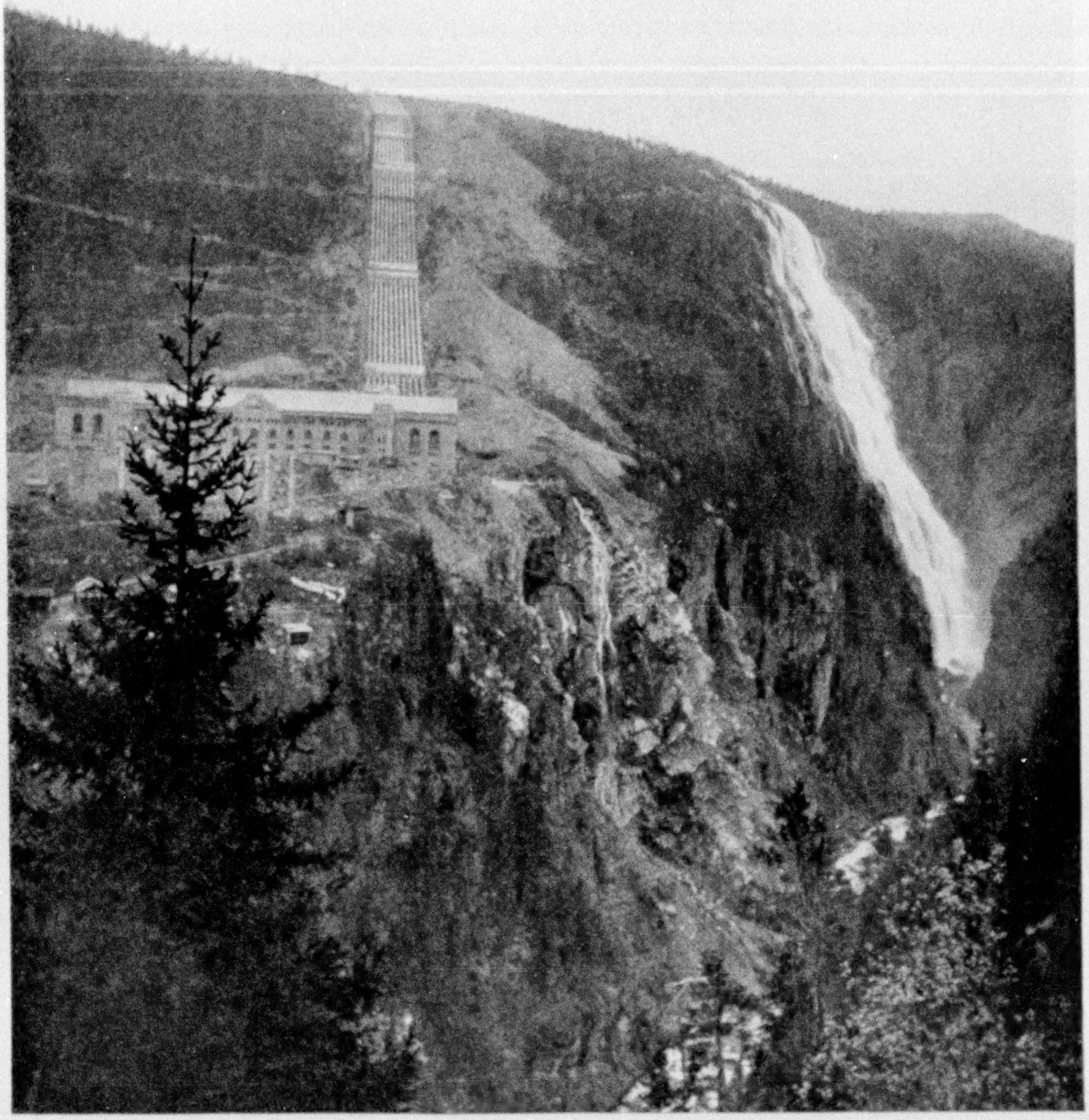


Photograph by A. B. Wilse

THE ZIGZAG ROAD TO MYRDAL

This station on the Bergen-Christiania Railroad is the highest point of the Flaam Valley, to which many tourists drive in two-wheeled carriages called *stolkjærre*. The road, a marvel of engineering, runs through wild ravines and along towering mountain cliffs, past high waterfalls. The last part of the road ascends in a zigzag of seventeen curves. There is a drop of 1,200 feet from the hotel on the left to the river.



Photograph by A. B. Wilse

A LEFT-OVER CATARACT AND ITS COMPANION POWER PLANT

A few years ago the Rjukanfos, or "Reeking Fall," 345 feet in height, was one of the greatest waterfalls in the world, and in spite of the tax which industry has placed upon it, it still remains one of the most beautiful in Europe. The power-house shown in the photograph turns the wheels of the greatest nitrate plant in Norway (see also illustration, page 684).

day or other import some of the examples of the weaving and designs of Fru Frida Hansen. Her best work is a reproduction of a historical design done by Munthe.

As yet, Norway has not rivaled the famous porcelain of Copenhagen; but Thorolf Holmboe has produced a china of Porsgrund made characteristic by its pictures of little polar bears and its fine glaze.

The Norwegians are quick to encourage new designs in jewelry founded on early national themes. In the country districts one frequently sees very beautiful examples of the jeweler's art done by village craftsmen, and many of the peasant girls would disdain to wear the vulgar ornaments, made by the bushel, eagerly bought up by tourists who have not yet learned that jewelry ought to be as individual and as national as possible.

XUM

Norway does not show such a dislike to emigration as Sweden. You can scarcely enter into conversation with an intelligent and patriotic Swede without hearing regret that so many of his countrymen have gone to the United States and other American countries. He does not hesitate to say that he looks especially on the United States as a sponge, which is absorbing the strength of his country, if not its brains.

It has become almost a passion in Sweden to prevent emigration, and even the present King of Sweden, who is very tolerant, has made it known over and over again that he would be very happy if he could keep his people at home.

In Norway, however, although the patriotic citizen desires that the Norwegian should stay in his own country, he is still a Viking at heart, and any great adventure appeals to him. It is true, too, that if the government should attempt through legal disability to keep the honest Norwegian at home, he would probably emigrate in a body.

The horror of the Puritan at the illegitimate child is hardly understood in the rural districts of Norway, and in the cities it does not seem ever to have existed. In contrast to this laxity, there is a great honesty, a great sincerity, at times an almost intolerable frankness, and a love of justice.

### TOURISTS SELDOM LEARN HOME LIFE AND CHARACTER OF THE NORWEGIANS

The tourist who knows only the northern coast of Norway, or one who judges the country only from the pictures of the novelists and magazine writers, learns very little of the home life of the people, and, seeking the picturesque and the unusual, overlooks the serious spirit and the economic progress which characterize the inhabitants.

In Europe, if an American does not speak with a provincial accent he is set down as not a real American. Similarly, a Norwegian must be ferocious, in a manly way, robust, and almost brutal, or he is not a real Norwegian. It is not understood that in Norway one does not live constantly under snow and between great fjords, and that there is sometimes even great tranquillity without melancholy among the people.

On one occasion in Copenhagen the best-known composer of Icelandic music—that is, of music founded on Icelandic themes—gave a concert. The Concert Palace was crowded, but nearly everybody came away disappointed. The symphonies were not at all Icelandic, they said. The ancient story of the man who saw a lion in a menagerie for the first time and said, "That ain't no lion," applies here.

Another impression very hard to dissipate is that the Norwegian is a hard drinker. It is supposed that he almost lives on the wine of the country, *braendevin*, a kind of gin, and in the popular stories the Norwegian in a mob is always drunk, if a terrible Swede can not be found to assume that character.

The romancers would lead us to believe that "*Skaal!*" is his favorite salutation, always accompanied by huge draughts of some fiery liquid. The legend that his ancestors drank the most ardent mead from the skulls of their enemies has tinctured the modern attitude of mind toward all the Scandinavians.

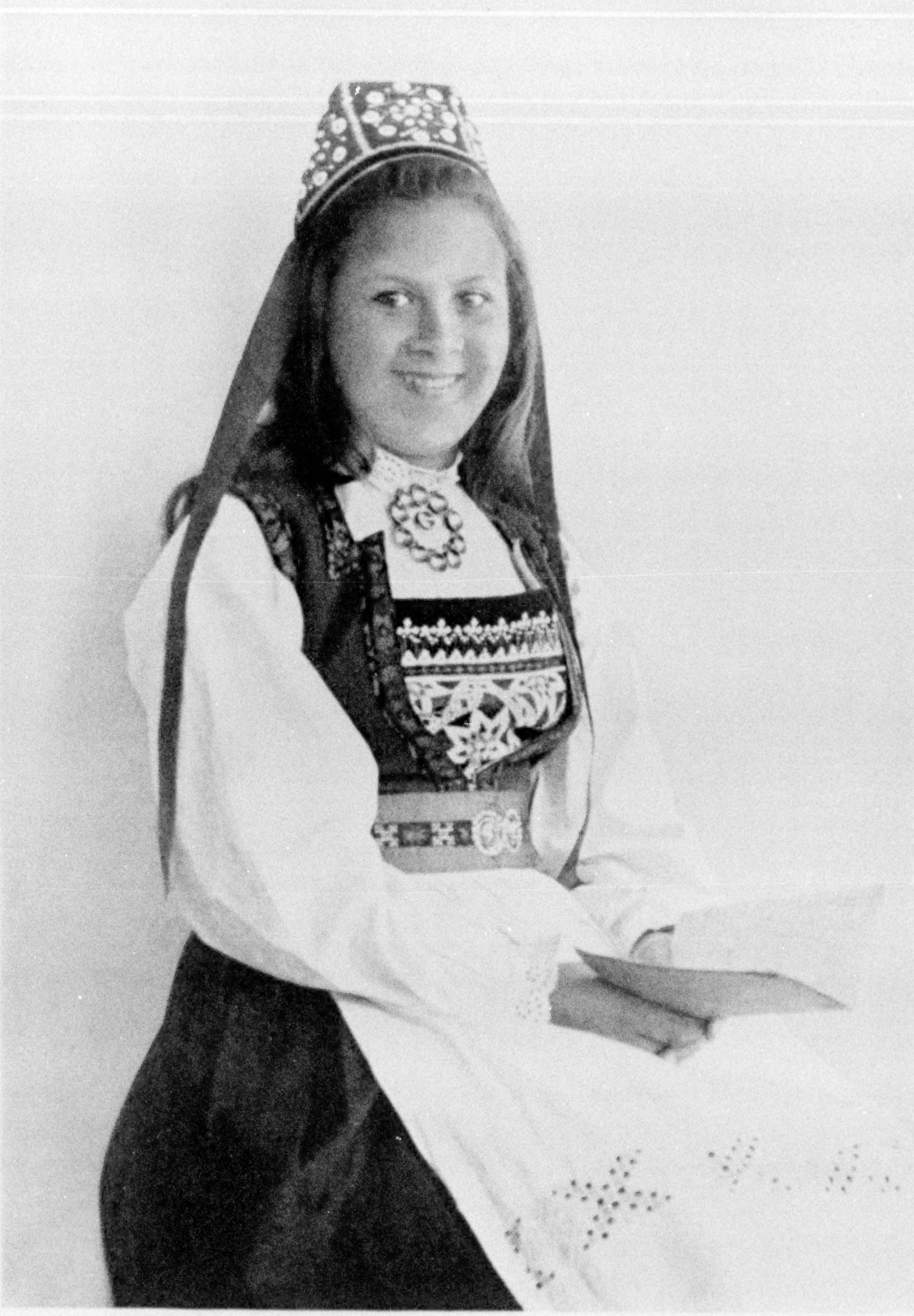
The characters of the Dane and the Norwegian reflect the geography of their countries.

Denmark is flat, lake-studded, a series of islands. It is almost entirely agricultural. It has its fisheries of great extent, it is true, but the famous Danish sole is not of the kind that makes its home near a rocky and tumultuous coast. Denmark has no natural, merely industrial, advantages.

Norway, on the contrary, now that its people have begun to understand the value of their "white coal" and are using their schools to produce scientific men, is rapidly becoming one of the most important industrial factors of Europe.

### BERGEN WAS ONCE THE FISH MARKET OF CHRISTENDOM

I admit that I am amazed by the industrial development of Norway; but to me the fisher folk and the fishers seem the most interesting of all the Norwegians who work with their hands, and consequently Bergen, with its great fish market, seems to me worthy of the closest study. Much earlier than the thirteenth



Photograph by Donald McLeish

A RURAL DÉBUTANTE OF NORWAY

Her gown is smart and modish, though her grandmother probably wore one exactly like it. She delights in her brooch and buckles of silver, and her bodice of red material, which is adorned, as is her cap, with colored beads in varied designs.

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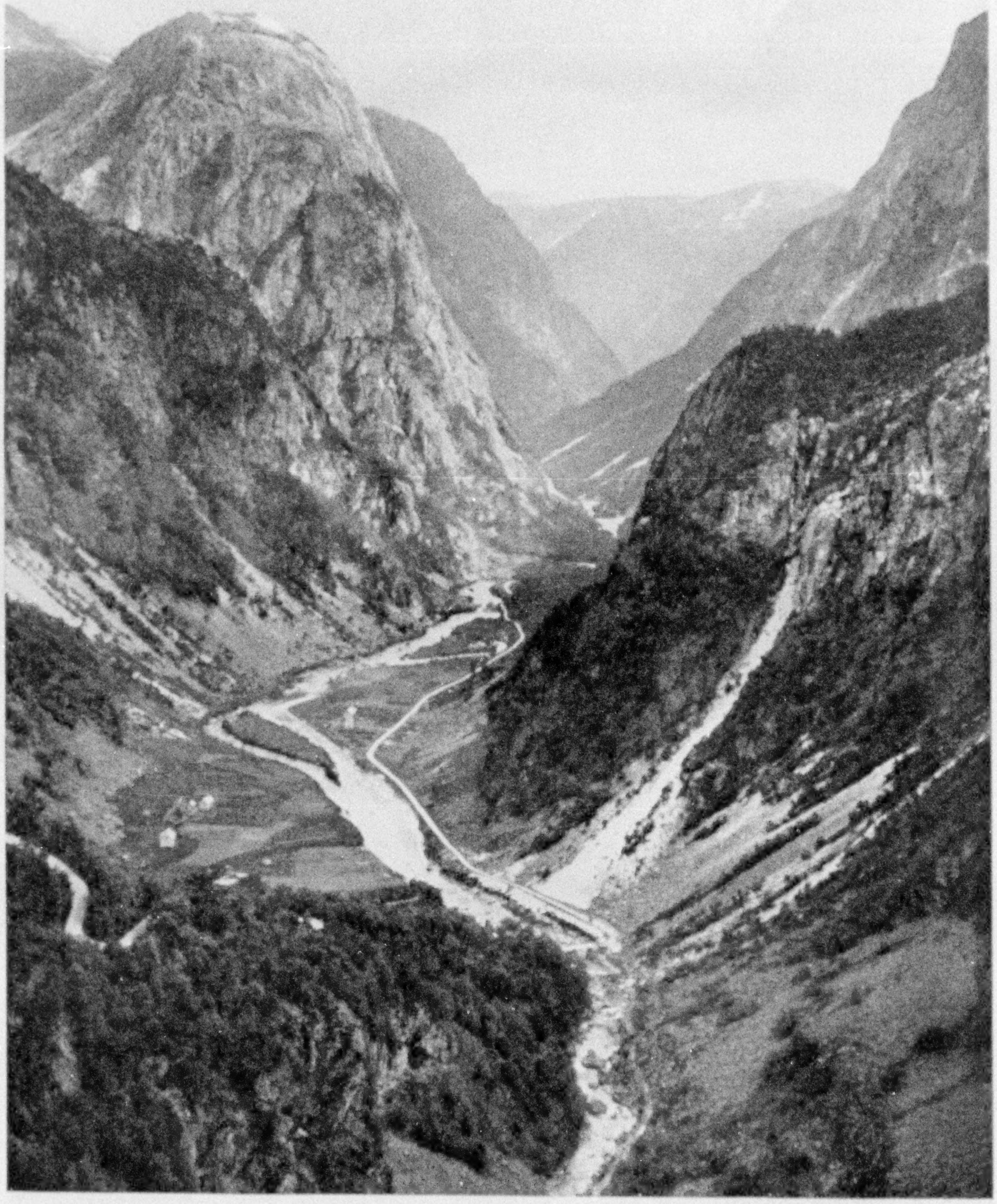
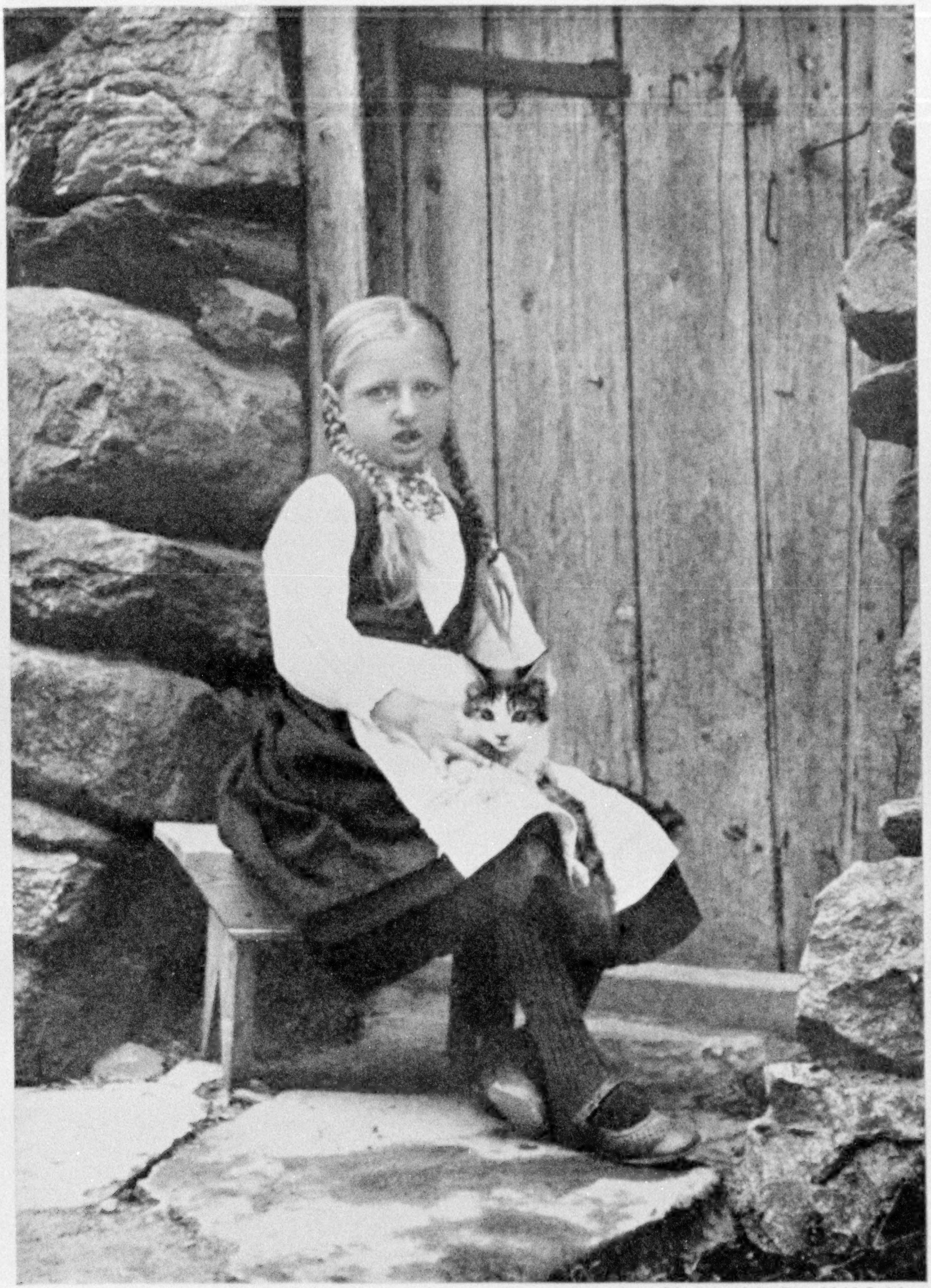


Photograph by Donald McLeish

THE NAERÖ WINDS BETWEEN THE EVERLASTING HILLS

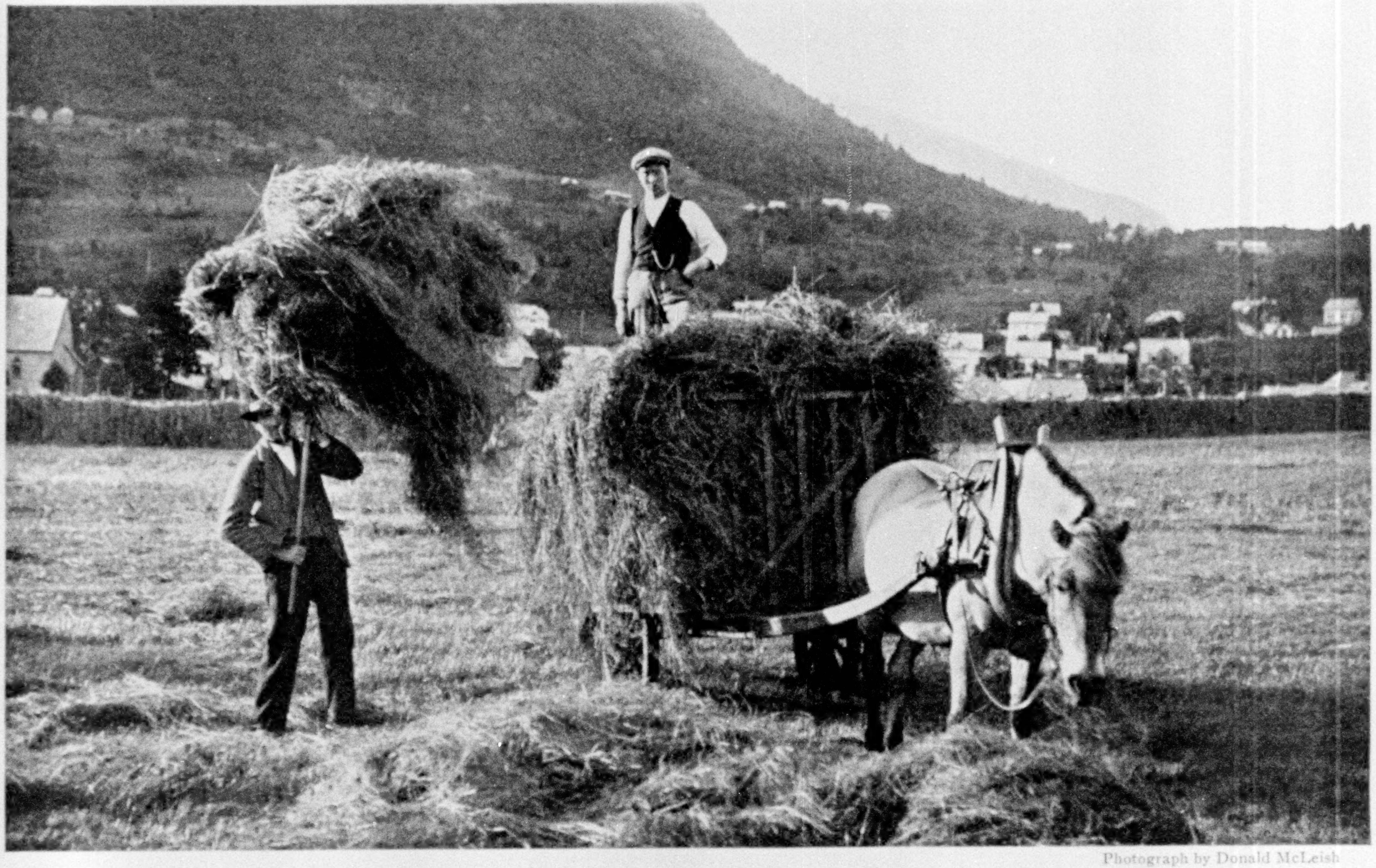
This deep, somber valley, flanked by sheer mountains, with a threading torrent rushing between the few scattered houses, affords one of the most impressive views of inland Norway. On the left is the blunted cone of the Jordalsnut. In the distance are the mountains surrounding the equally wild Naerö Fjord.



Photograph by Donald McLeish

A SHY LITTLE MAID OF THE NAERÖ VALLEY

The high peaks which enclose the deep valley of the Naerö are so steep that the people never see the sun in winter, but this wildest part of Norway attracts thousands of summer tourists. This little girl is wearing red stockings to enliven her black and white costume, and the inevitable large silver brooch which most Norwegian women affect.



Photograph by Donald McLeish

WHERE FARMING IS FRUGAL AND PRIMITIVE

Farms nestle in every fertile spot in the narrow valleys, on diminutive islands in streams, and on rocky shelves on the cliffs of the fjords. In some regions hay is rolled into bundles and let down by wire ropes from a mountain farm to the barn, far below.

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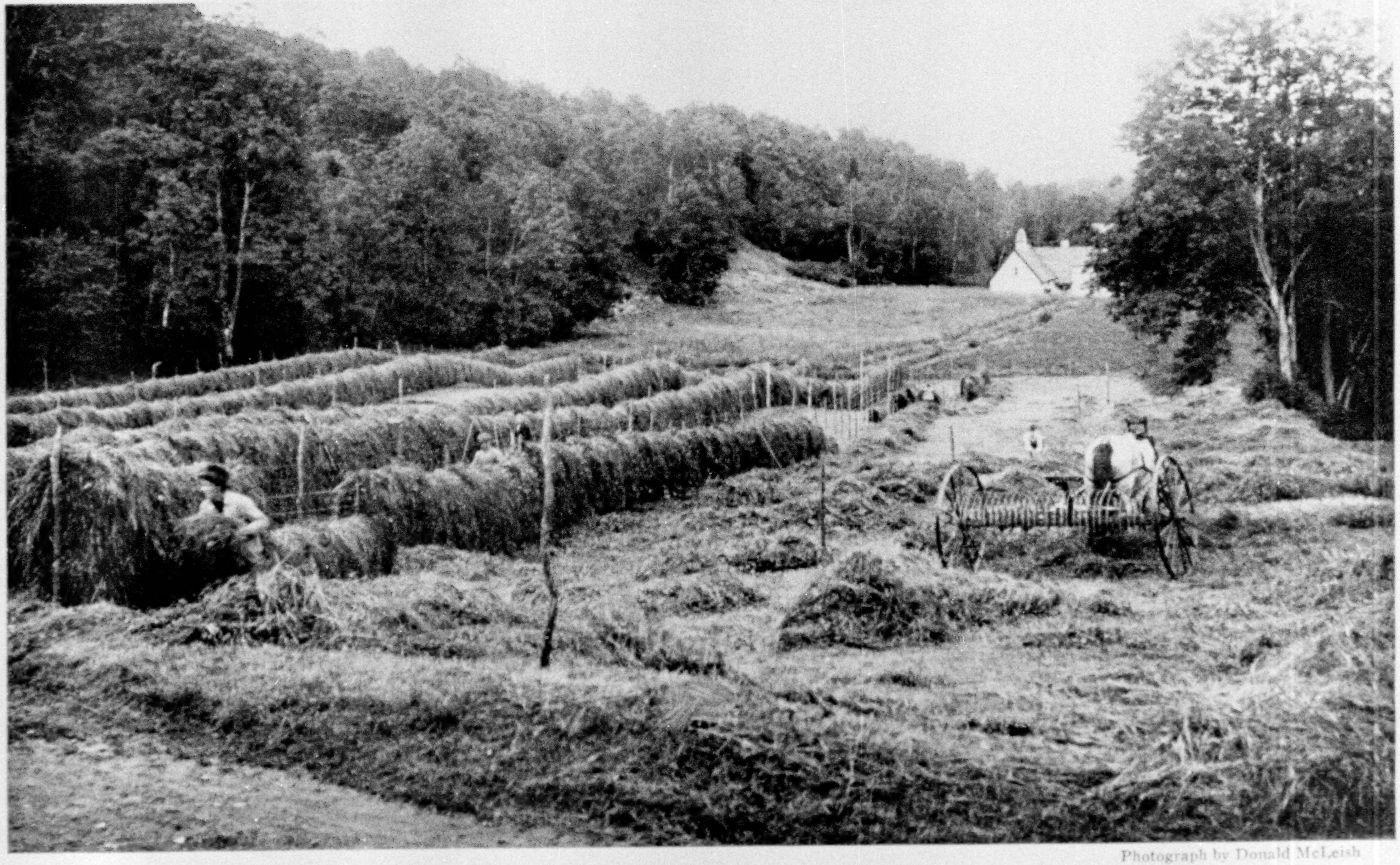
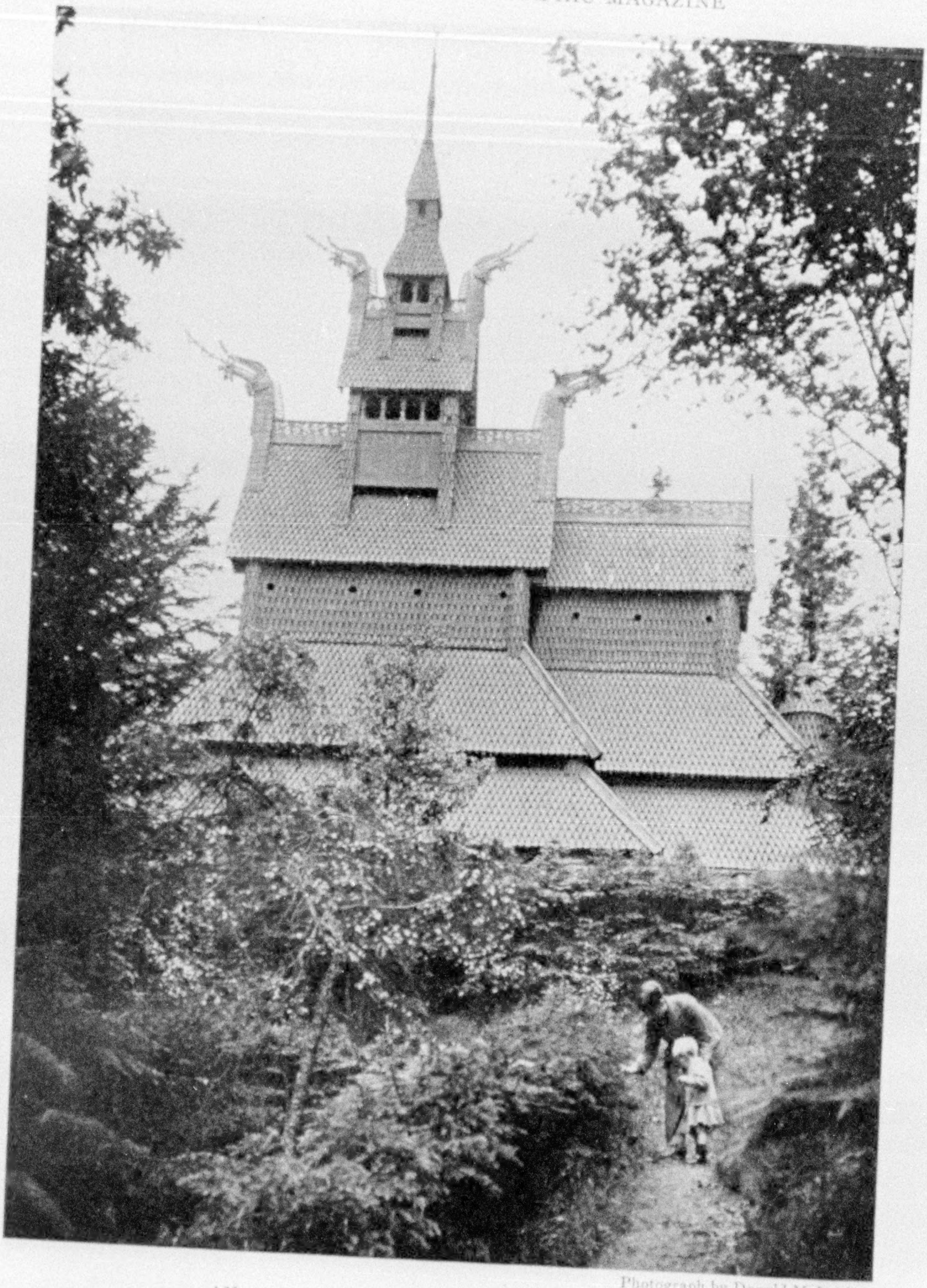


Photograph by Donald McLeish

MAKING HAY ON A NORWEGIAN FARM

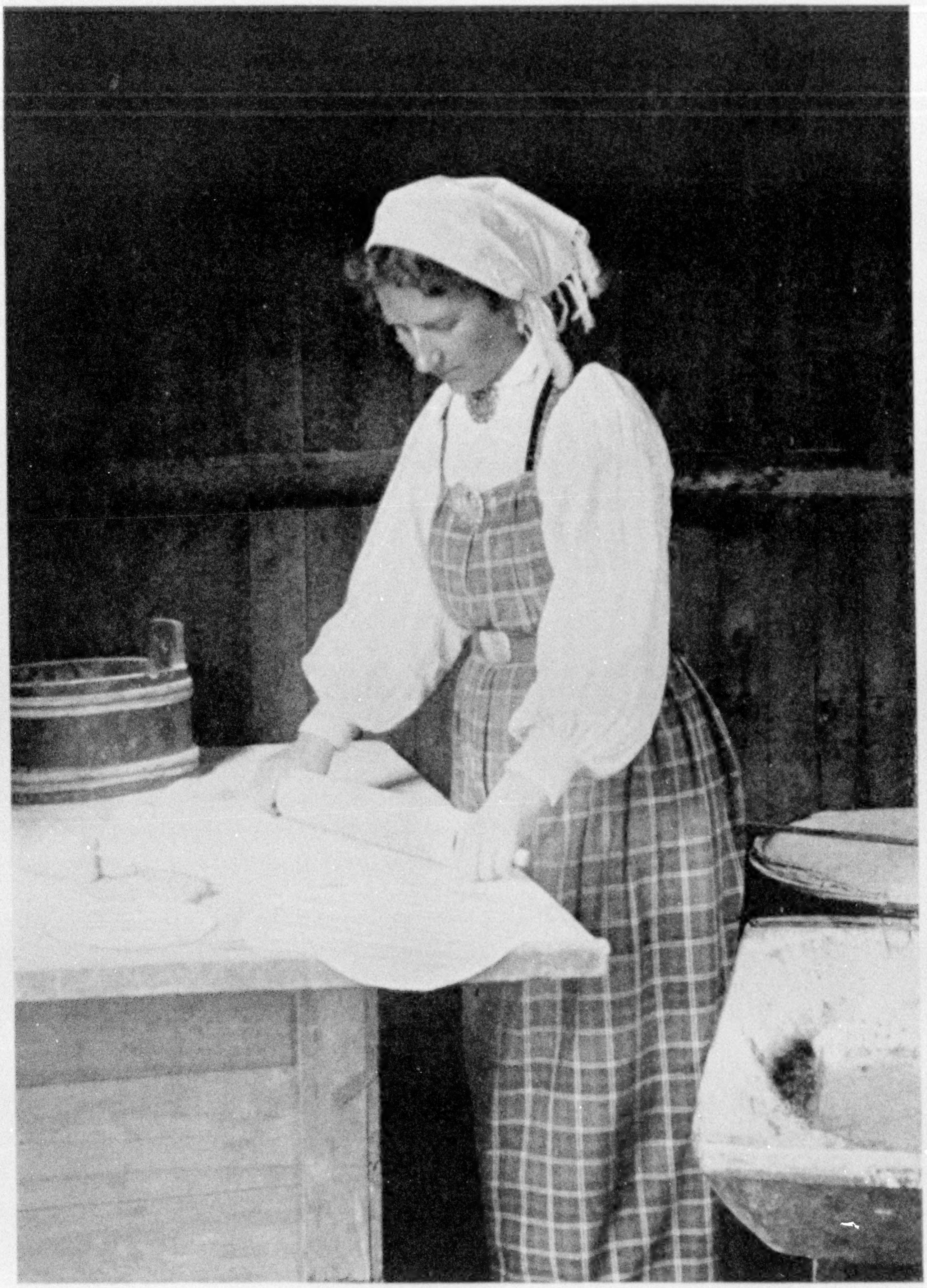
Contrary to the custom of other countries, where hay is gathered into sheaves or shocks, the Norwegian farmer suspends his fresh-mown hay on wire strands strung along rows of upright posts. This hay arbor is advantageous in a damp climate.



Photograph by Donald McLeish

AN ARCHITECTURAL MYSTERY NEAR BERGEN

The origin of Norway's ancient wooden churches, or *Stavekirker*, resembling Chinese pagodas, is unknown. At one end of this church is an opening known as the Lepers' Window, at which a leper communicant, standing outside, could receive the Sacrament.



Photograph by Donald McLeish

A HOUSEWIFE OF AAL MAKING "LEPSE"

This is a sweet bread flavored with aniseed, rolled very thin, and baked on an iron plate over an open fire until crisp. It is much more of a delicacy than the familiar *fladbröd,* which differs from the Swedish bread, *knäckebröd,* made from rye.

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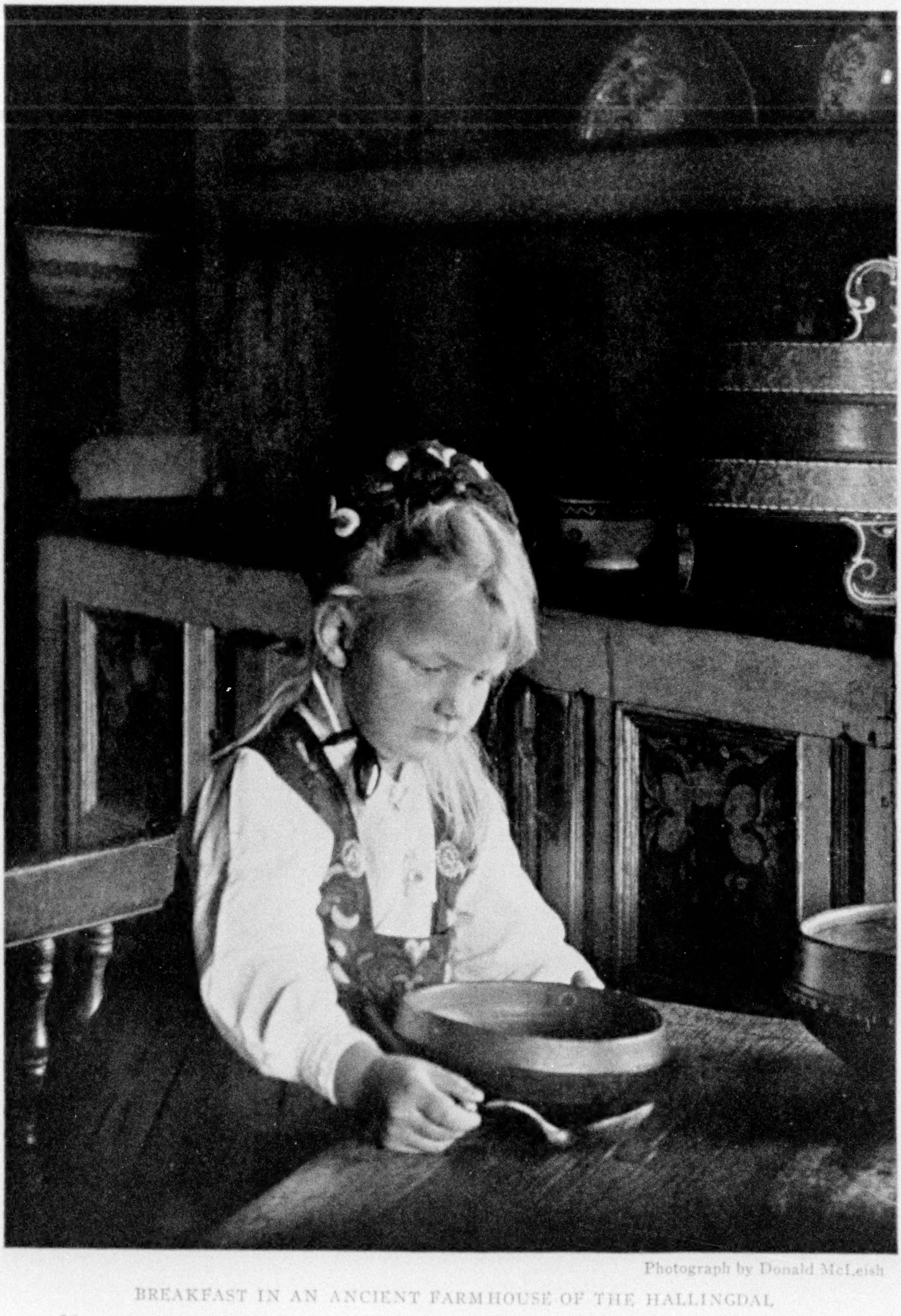
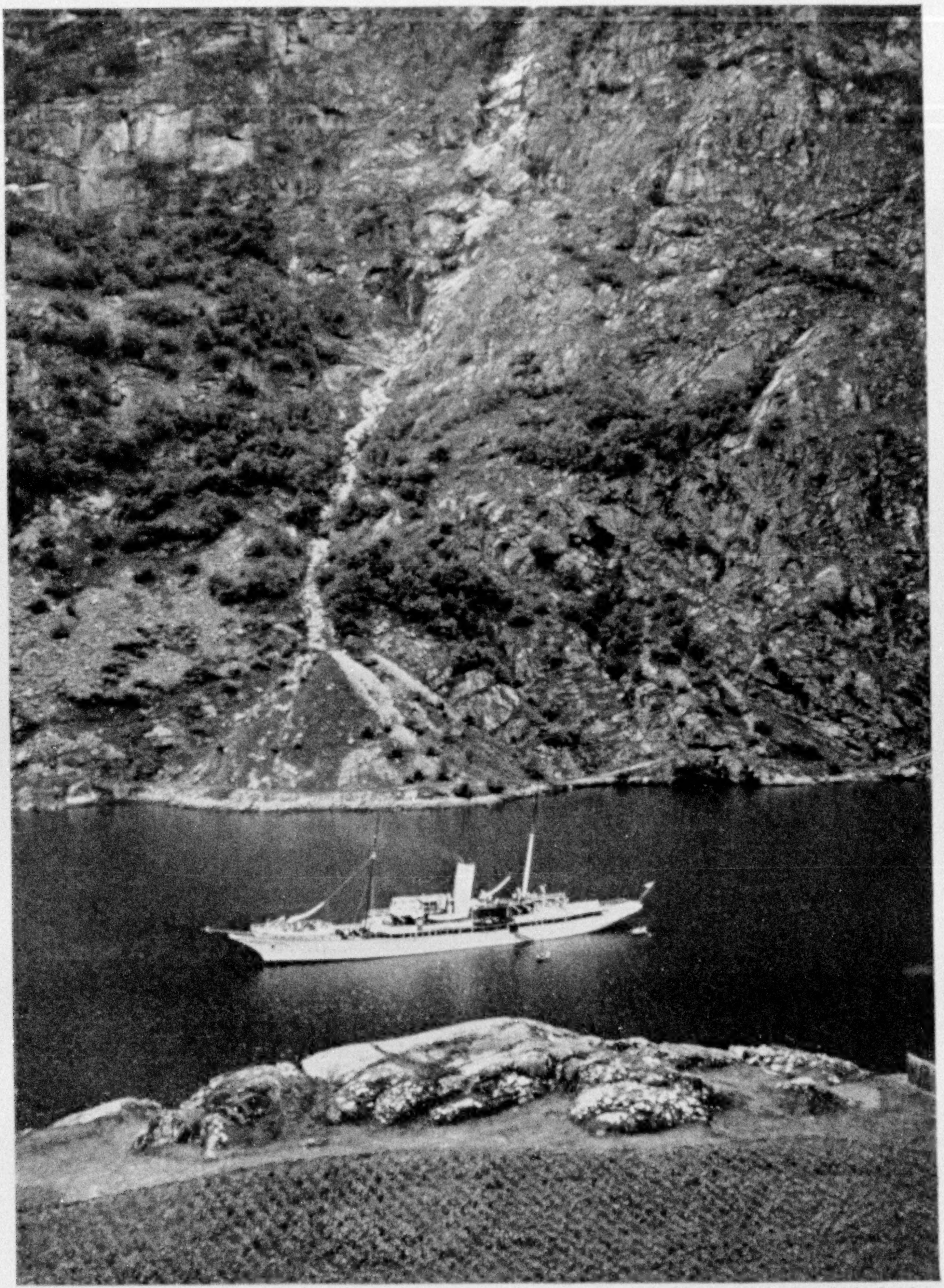


Photograph by Donald McLeish

BREAKFAST IN AN ANCIENT FARMHOUSE OF THE HALLINGDAL

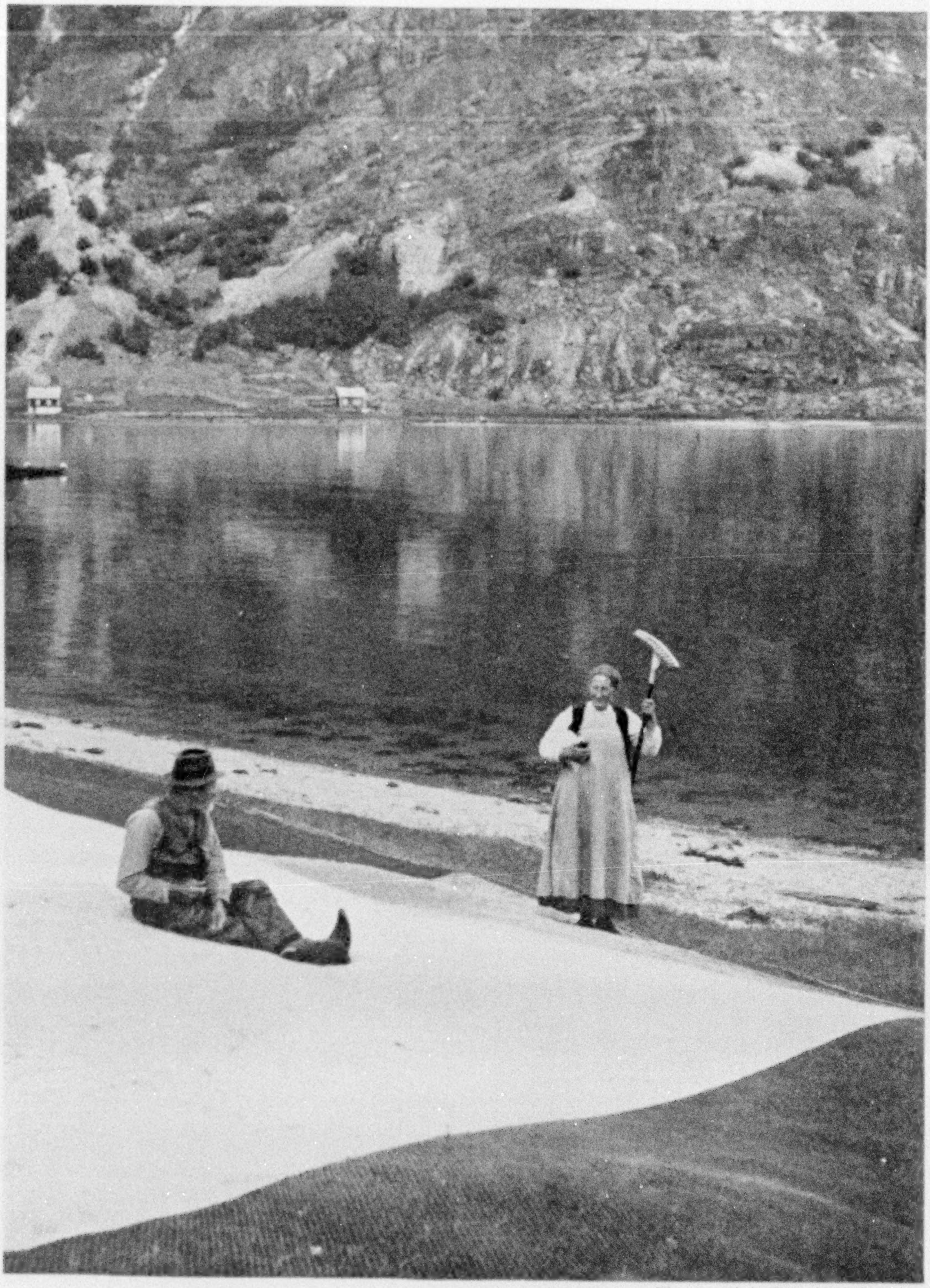
Many famous Norwegian sagas, half legend, half folktale or history, are associated with the Halling Valley, where, in the summer, the Norwegian drives his cattle to the *saeter* or out-farm, situated in the mountains some miles from the home-farm.



Photograph by Donald McLeish

A STEAM YACHT ANCHORED AT THE HEAD OF THE NAERÖ FJORD

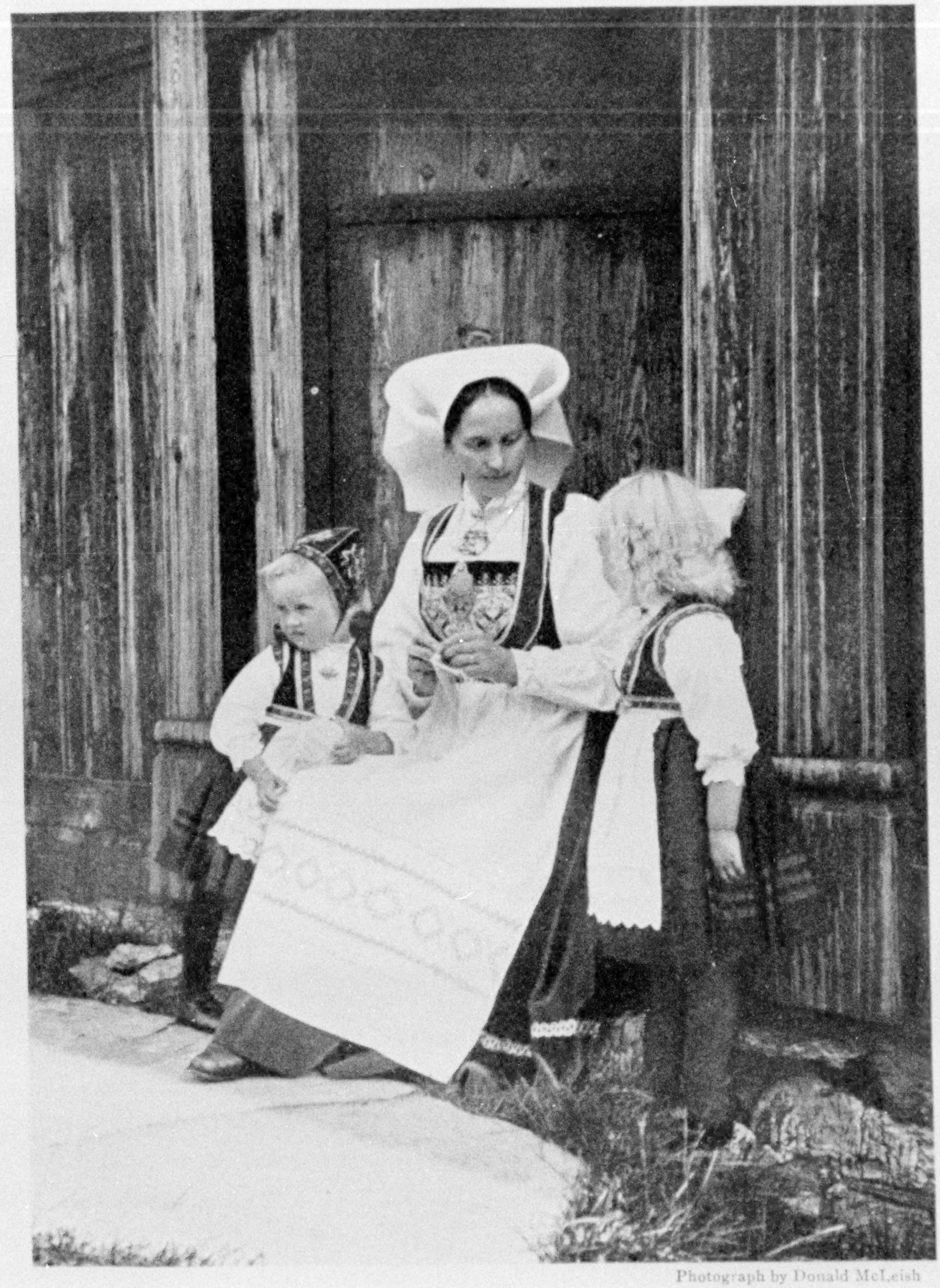
This is one of the most impressive fjords in Norway. It is not navigable in the spring, as torrents of melting snow and ice from the mountains, carrying along rocks large enough to sink a passing vessel, dash down its perpendicular walls.



Photograph by Donald McLeish

A CHAT BY THE EDGE OF AURLANDS FJORD

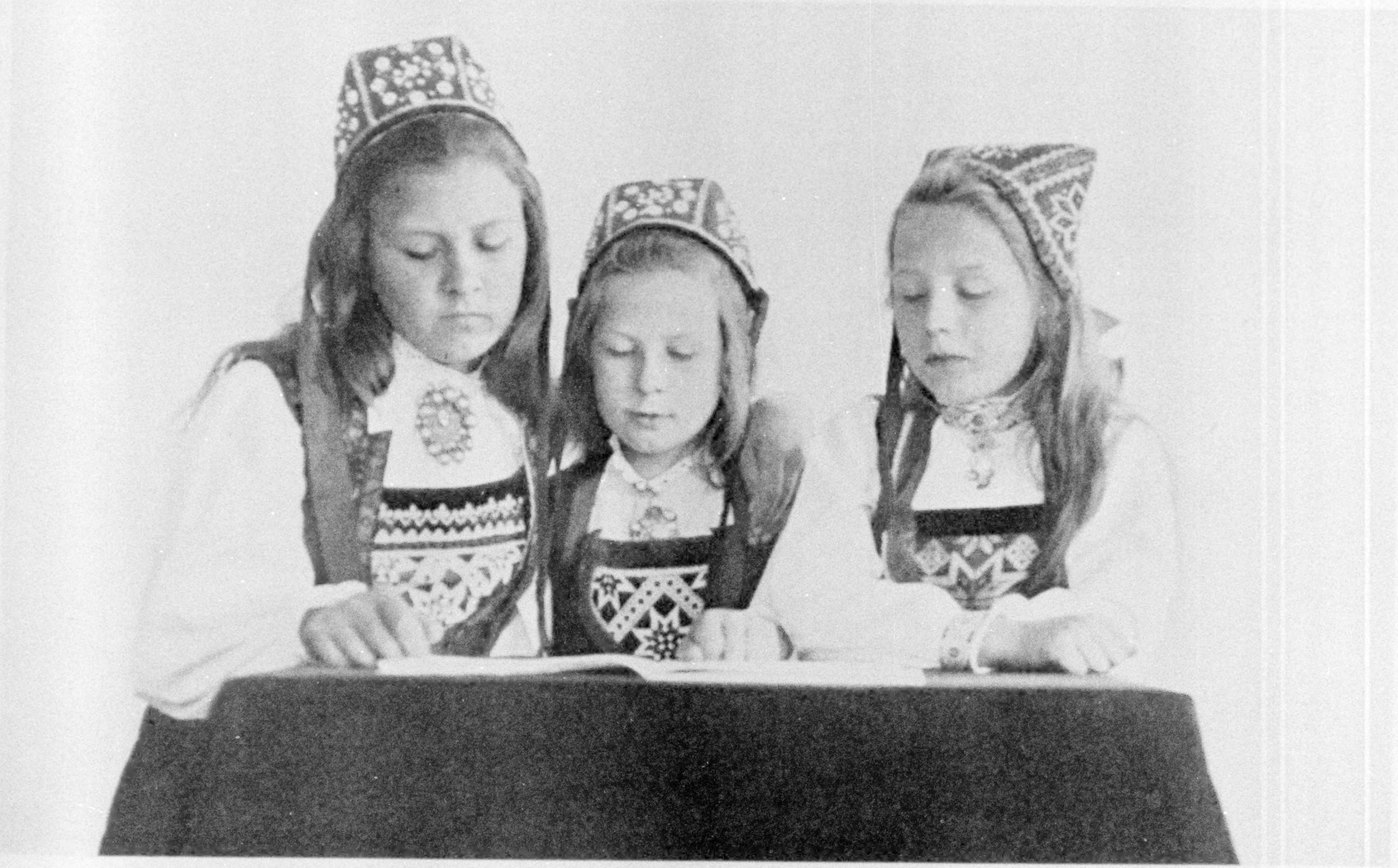
Waterfalls, on both sides, leap out direct or glide in foamy streaks over dark-brown rock down precipices from 3,000 to 3,900 feet high. A few houses have been built on alluvial deposits or perched on lofty rocks. This fjord is rich in fish, much of which is exported, and the inhabitants, when not afloat, spend their time in making and repairing nets.



Photograph by Donald McLeish

A MATRON OF THE HARDANGER DISTRICT

Locality, not changing fashion, gives diversity to Norwegian styles. By their embroidery and design one can tell the district, sometimes the village, of the wearer. The Hardanger costume is regarded as one of the prettiest of all Norway. The distinctive mark of the married women is the *skaut*, a white linen cap folded and starched.



Photograph by Donald McLeish

FASCINATED BY A BOOK OF PICTURES

These little maids of the Hardanger are arrayed in gaily colored bonnets and bodices of red velvet adorned with colored beads worked into intricate designs. The silver *solje*, a kind of brooch, generally an heirloom, is a characteristic feature of the costume.

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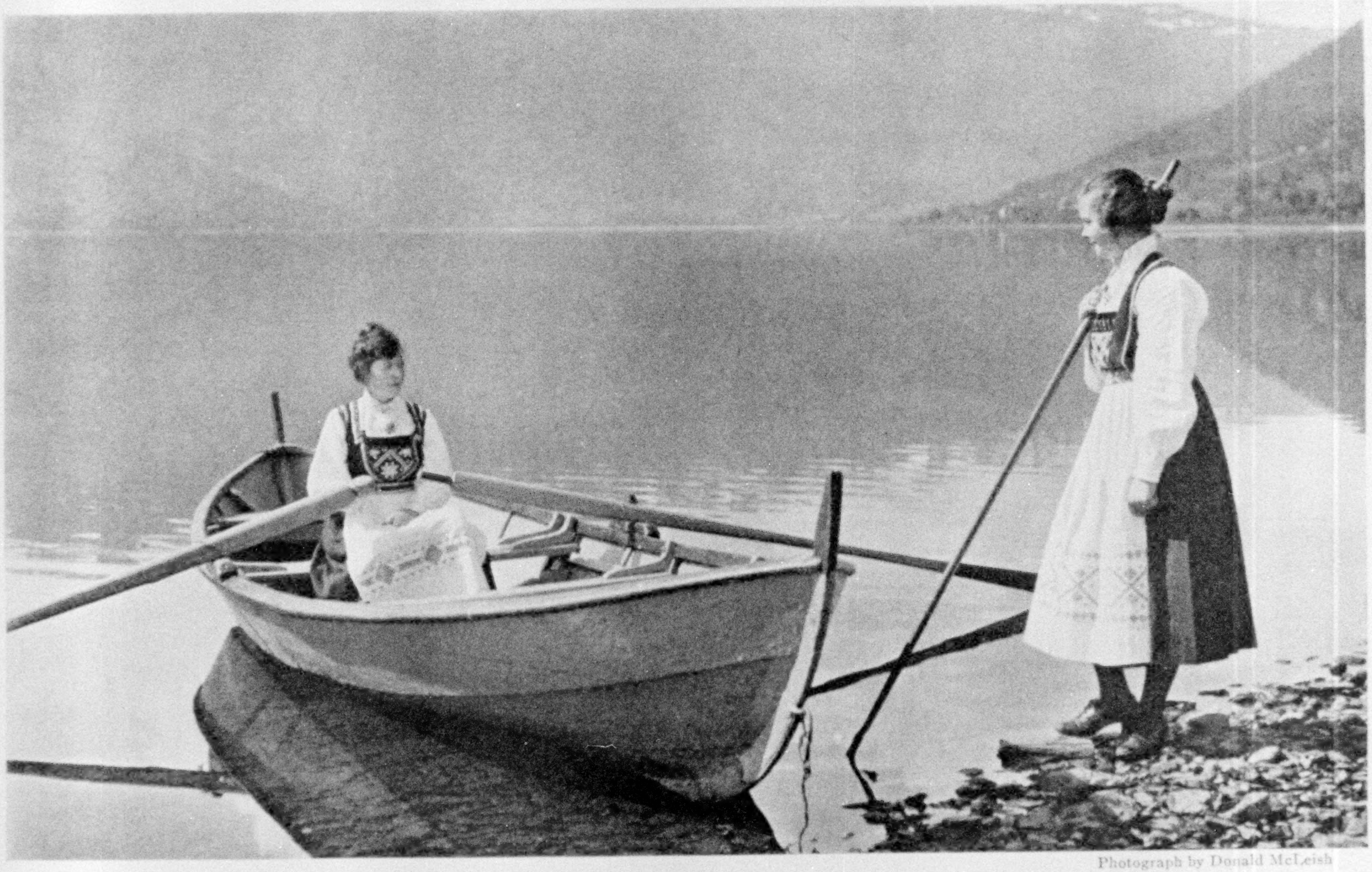
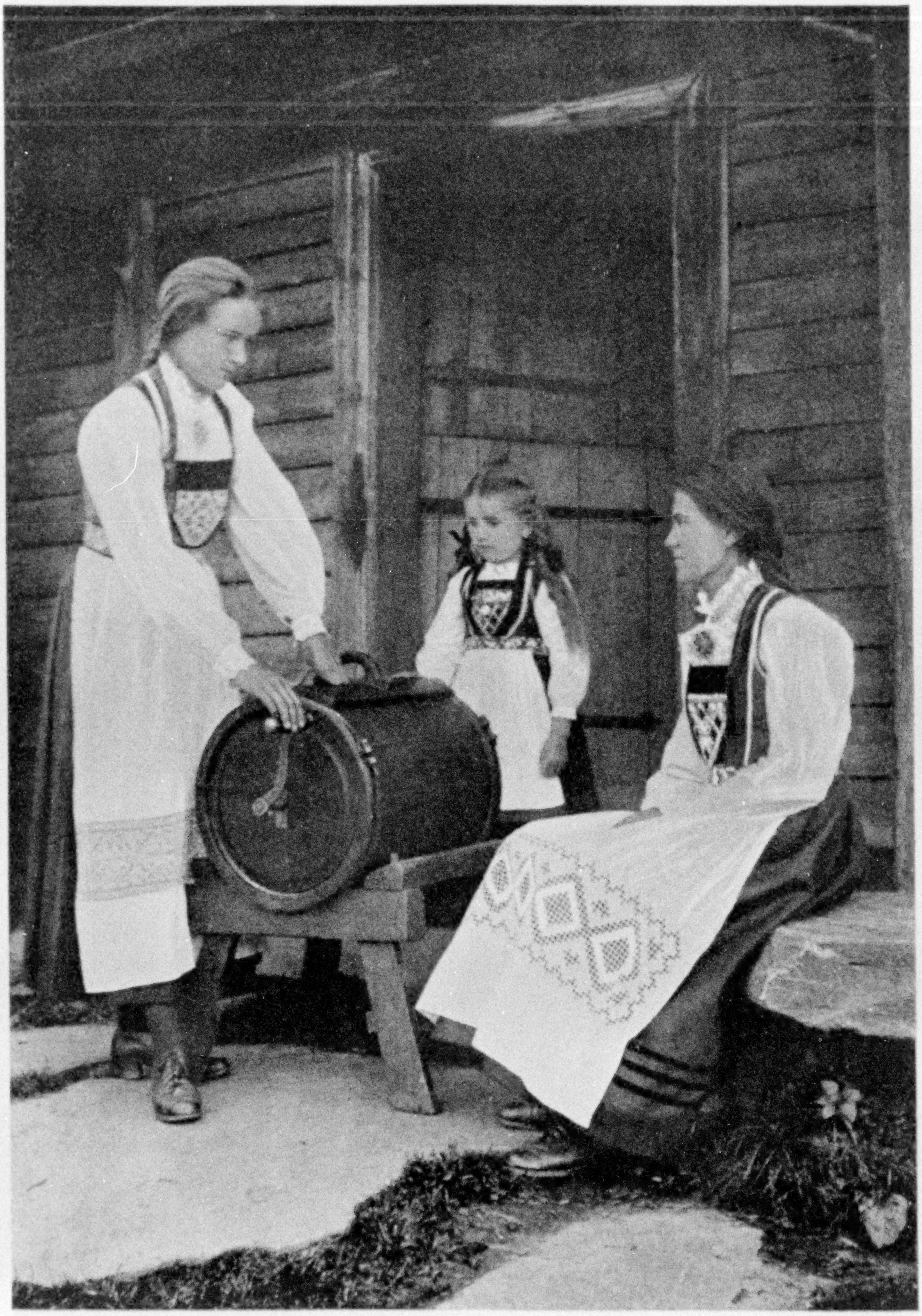


Photograph by Donald McLeish

GIRLS OF THE HARDANGER DISTRICT AT THE EDGE OF THE BEAUTIFUL VOSSEVAND: UNMARRIED WOMEN DO NOT WEAR CAPS

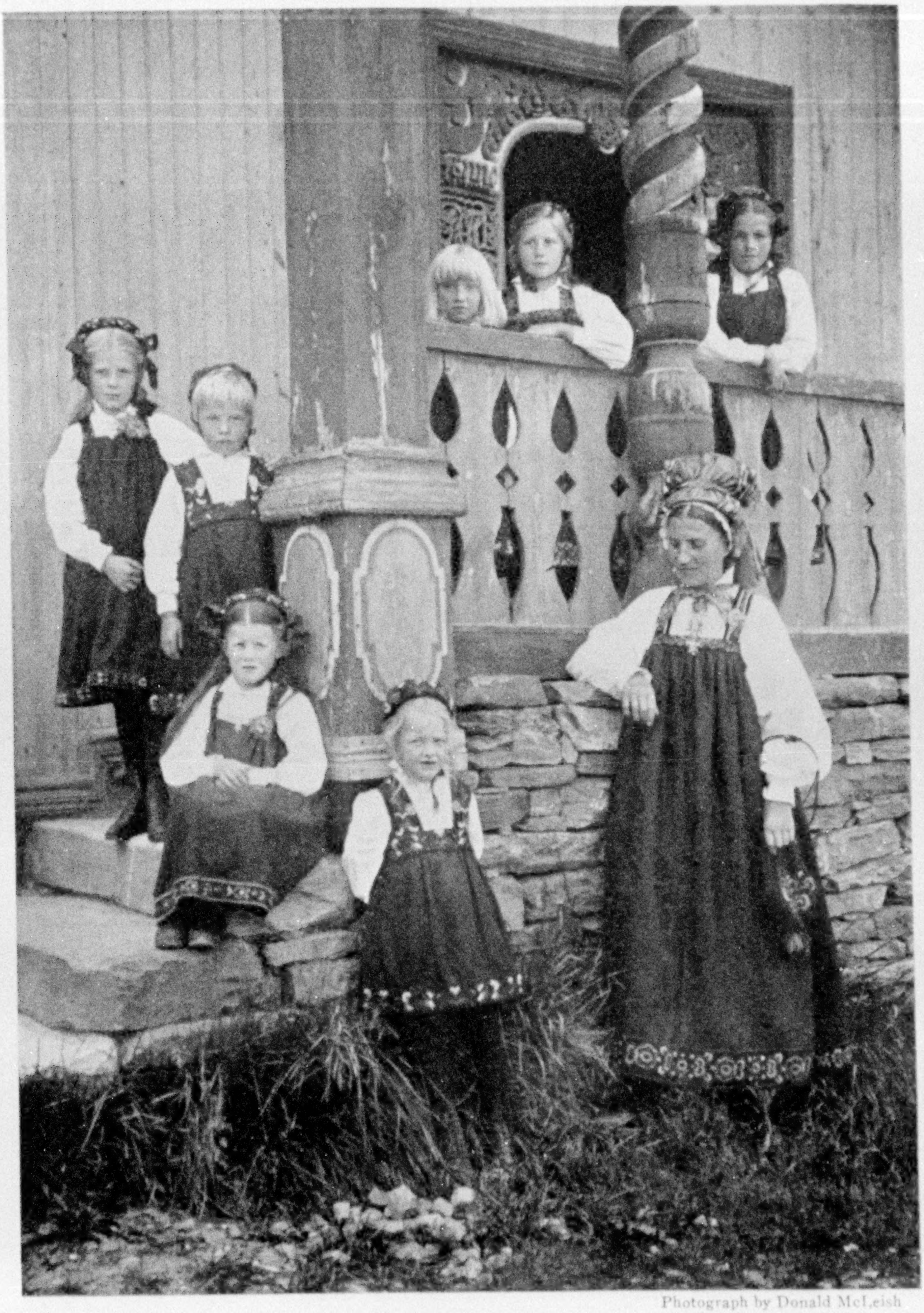
At the eastern end of this lake, between the Hardanger Fjord and the Sogne Fjord, the famous tourist district of Norway, lies the little town of Voss, whose old stone church dates from 1271.



Photograph by Donald McLeish

GIRLS OF VOSS AT THE DOOR OF THEIR HILLSIDE DWELLING, A TIMBER CHALET MORE THAN 200 YEARS OLD

Far removed from the valley, the people are self-supporting, and the churning of butter and the making of cheese are carried on at their homes. The costume worn is similar to the Hardanger dress, except that the skirt is dark green.



Photograph by Donald McLeish

VILLAGERS OF AAL, IN THE HALLING VALLEY, STANDING ON THE STEPS OF THE 17TH CENTURY COURTHOUSE AND TOWN HALL

On Sundays the women wear the local costume, which in its peculiar cut and gaudiness of coloring is unlike those of any other part of the country. The variety of colored wools used in the embroidery and the numerous silver buckles and brooches produce an almost barbaric effect.

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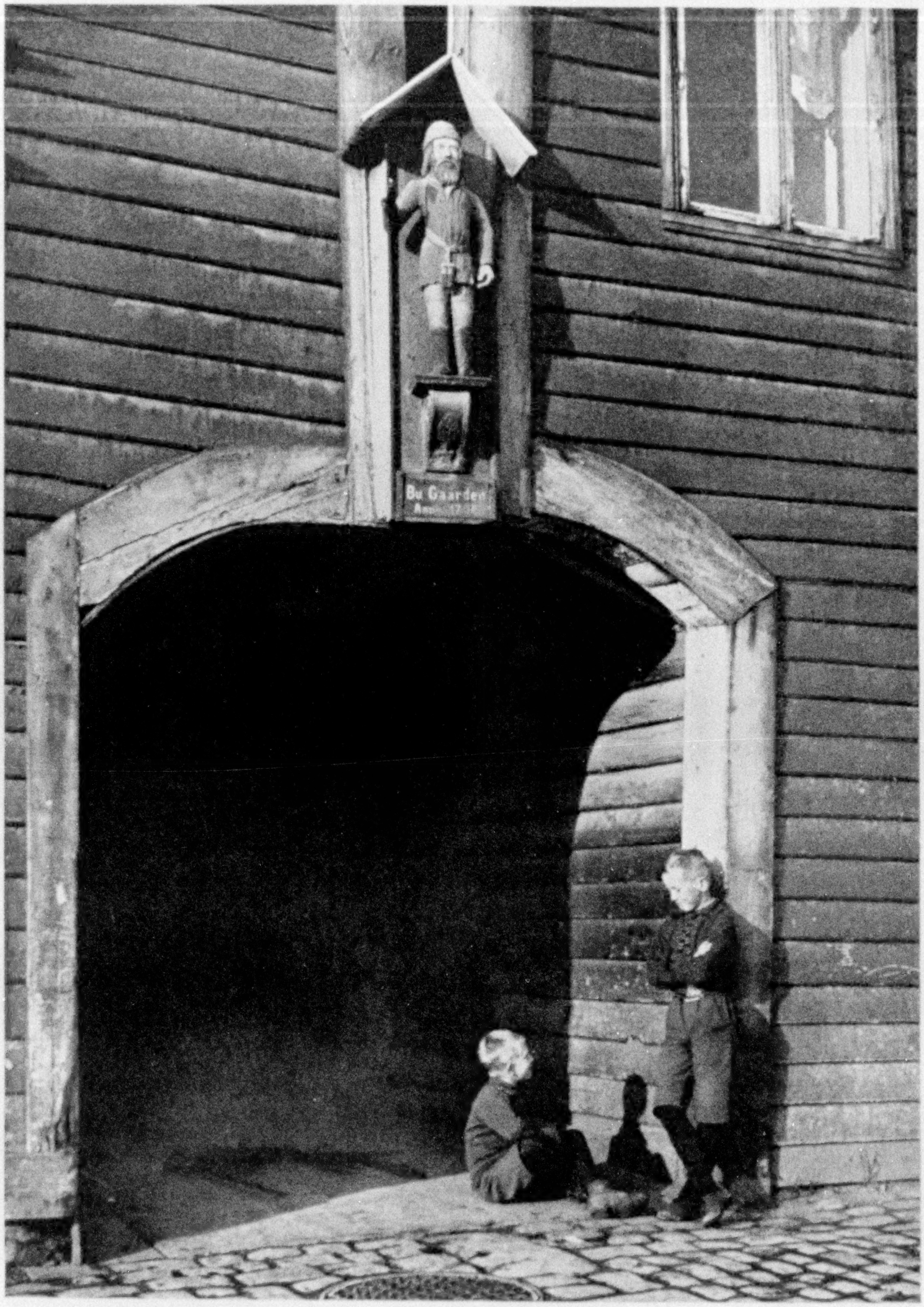


Photograph by Donald McLeish

THE ENTRANCE TO THE ANCIENT HANSEATIC "GAARD," IN BERGEN

Bergen's commercial prosperity in early times was due to the merchants of that giant medieval trust, the Hanseatic League, which established an office here in 1445. The timber *gaarde*, or warehouses, provided quarters for the merchants and their assistants. The wooden figure above this entrance represents a workman in the dress of the period. He holds a small ax, used to kill and cut fish, for which Bergen is still an important trading center in Scandinavia.

century a great part of Christendom was supplied through Bergen, on Fridays and other days of abstinence, with dried fish.

Even now cod, dried after the manner of the Middle Ages, is exported in great quantities. The process of salting fish has of late taken the place of the old method of drying. Salted fish is called *klip fisk*.

### THE EPICURE DELIGHTS IN BERGEN FISH

As the perennial cod has given its name to a certain class of aristocracy, known in New England as "codfish aristocracy," *klip fisk* is a phrase frequently used in connection with the Scandinavian immigrant in this country, especially in Minnesota; but he is so practical, as a rule, that he does not resent a term which reminds him of one of the industries of his native country, Norway or Sweden.

Bergen's reputation as a fishing port extends over the whole world. Its export of fish probably rivals the almost universal Danish export of butter. A sojourn either in Copenhagen or Bergen spoils the appetite of the confirmed fish-eater for fish in any other country.

In Copenhagen your cod, which when properly boiled and with the right kind of sauce is quite as good and less cloying than the salmon, is brought kicking to your door. "Hans," I once said to the most admirable of major-domos, "that cod you brought in last night to the table was enormous." "You should have seen, sir," he answered, "his struggles in the kitchen; I had a hard time killing him."

And in Bergen you can pick up in the fish market the most delicious fish ever created; and the Norwegians have almost as good a taste in sauces as the Danes, but they are not quite so Parisian. If the Danish sole would make a reputation for any country—when it is perfectly fresh it is even better than the English sole—a fresh cod and even the herrings of Bergen are very close in competition. It is unfortunate that in our country we seem to have all kinds of fishes, but only one sauce.

The sole of Denmark does not exist on the coast of Norway and our flounders are not found there. The cod and the herring are the typical Norwegian fish; the cod yields by-products of which cod-liver oil is the most important. The herring is a capricious fish and it is always rather a gamble as to whether a season will be good or not. The fishermen must remain taut and intensely ready to take advantage of their appearance.

The Lofoten fisheries are the centers of the greatest activities. There was a time when the fishermen traveled in open boats, but now the process of fishing is more scientific. The motor-boat was introduced, and the Norwegian fishermen would, I fancy, give a great bonus to any inventor who would produce an entirely noiseless type of this craft.

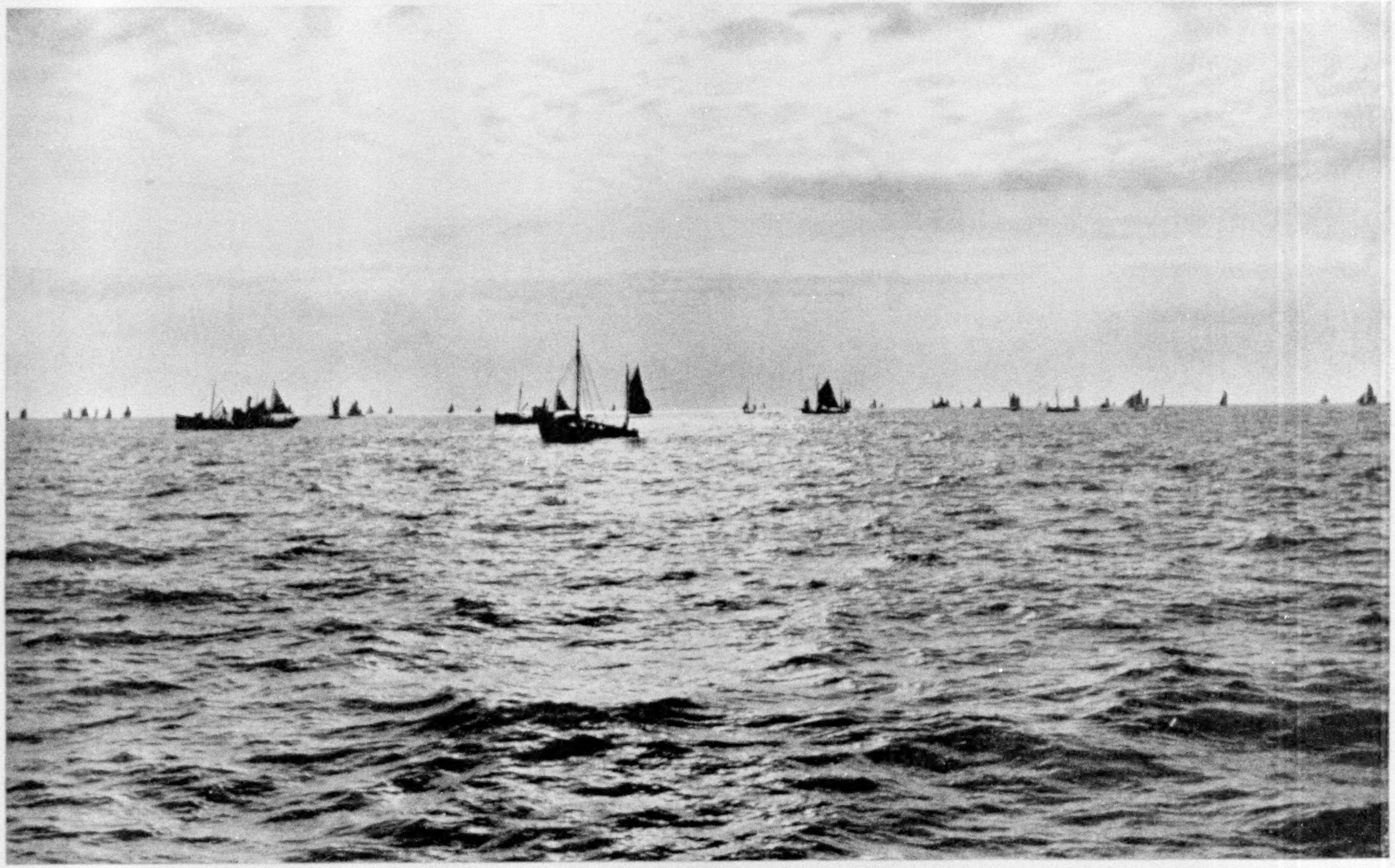
The Norwegians are greatly interested in religion and even in theology. The fishermen in their hours of ease divide their discussions between religion and politics.

### THE LAND OF THE SKI

Norway is often called the land of the ski. It is not an appropriate title, but unfortunately it has given the impression that the country is merely a land for tourists, who look on it as a place for the enjoyment of this kingly sport. In the winter everybody in Norway, outside the cities, goes on skis, which are not our snowshoes nor are they operated in the same way. Prince Olav owes much of his popularity to his being one of the most birdlike, graceful, and forceful managers of the Norwegian ski, which in skillful hands seems to partake of all the qualities of running or flying birds and animals. The art of skiing is part of the national education, and woe be to him who thinks that he can master it easily.

Some day an epic poet, under the new psychological pressure which interprets the complex, will no doubt make the ski the subject of a poem which shall include the expression of all the Norwegian national characteristics. It is a democratic sport; it does not require the outlay of money necessary for polo or even golf, and he who studies the science and art of the ski will learn many of the secrets of this unique, progressive, yet unchanging people of the North, who, like skilled masters of the ski, always manage to fall on their feet.

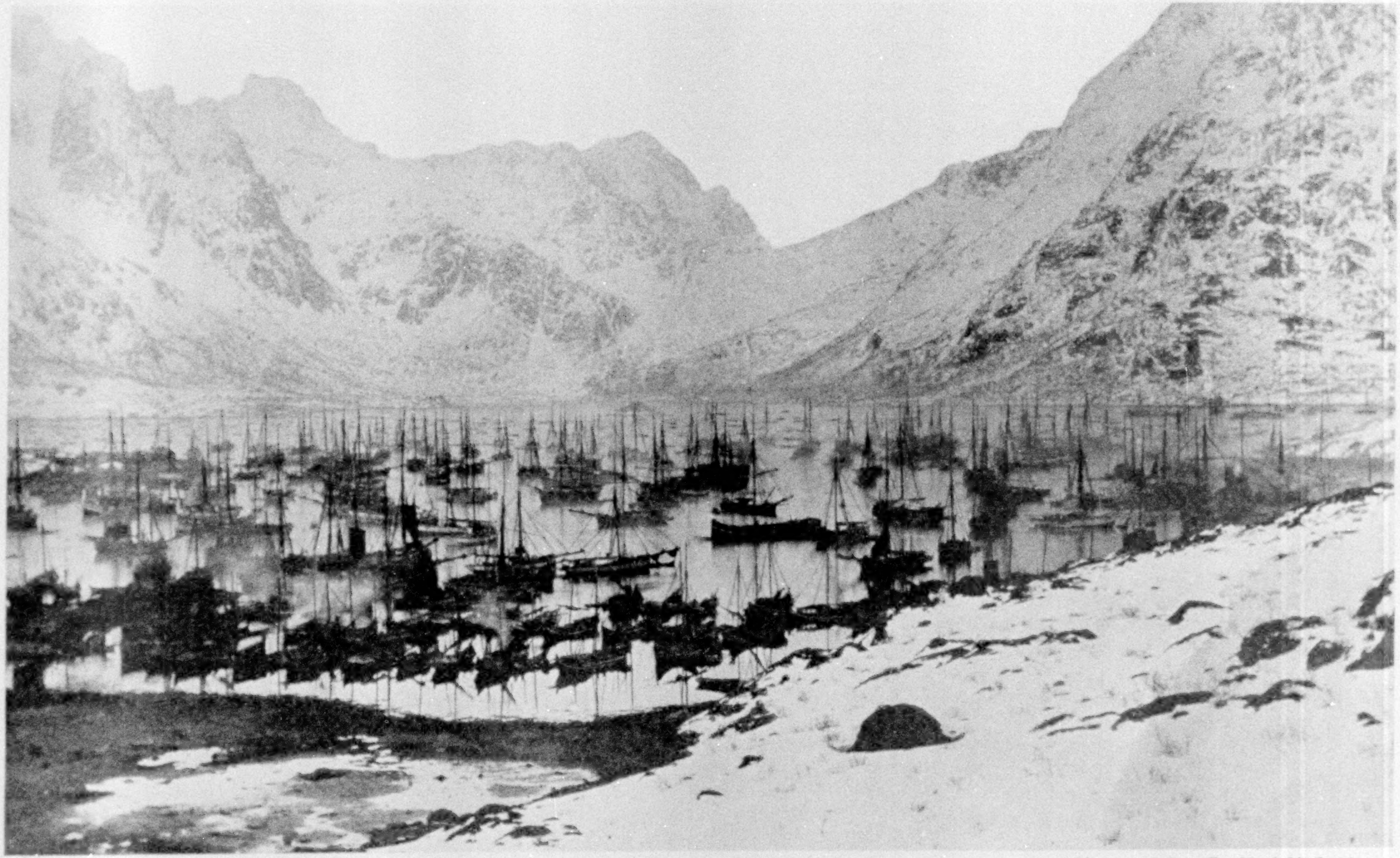
Sailing into the harbor of Christiania, one's first impression is that of what is



© A. B. Wilse

ON THE LOFOTEN BANKS

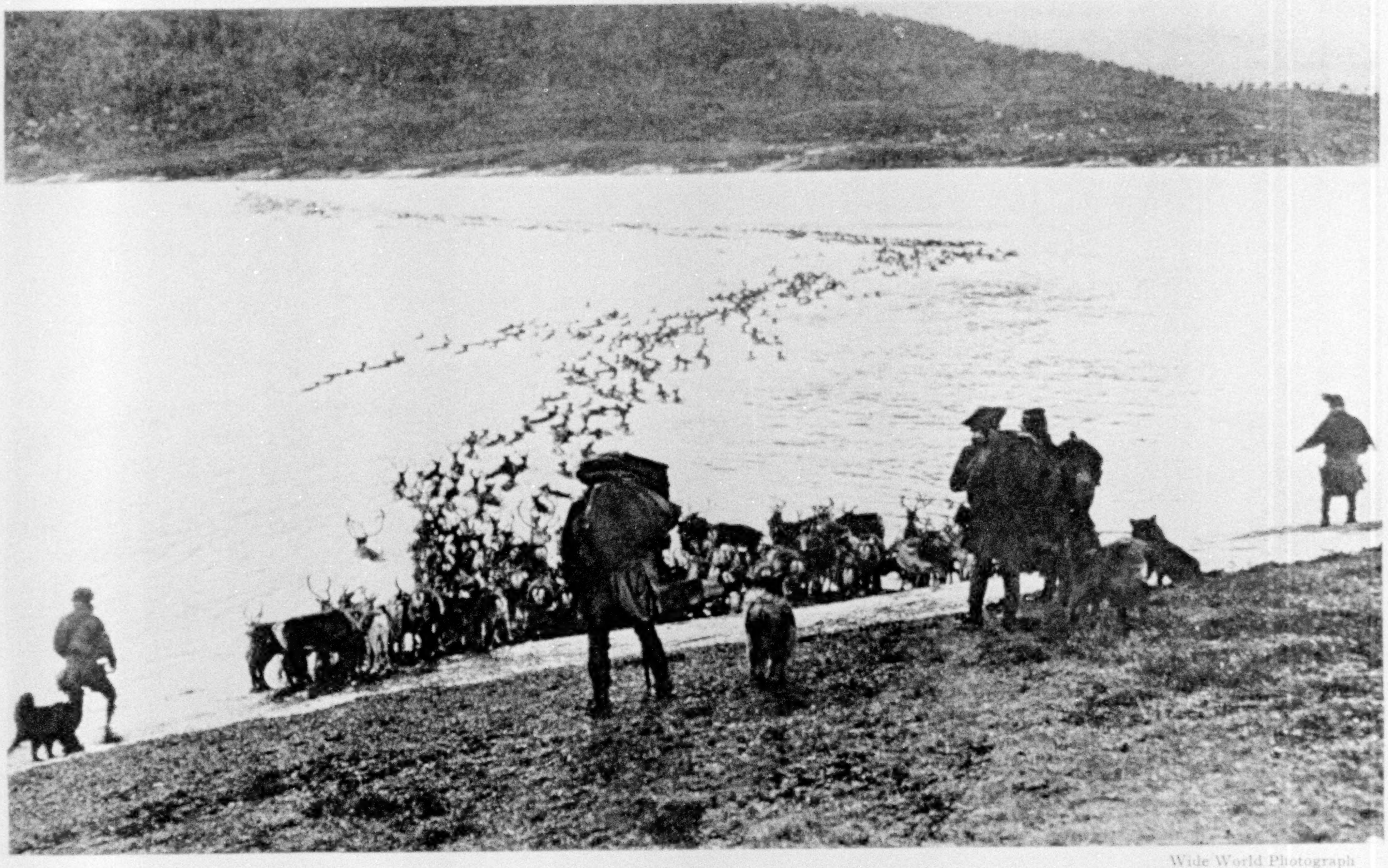
The four large islands of the Lofoten group, with many smaller ones lying between, have been aptly likened to a gigantic backbone trailing off from the Vesteraalen Islands into the Norwegian Sea. During the fishing season fishermen from all of northern Norway distribute themselves over its 36 banks. The dread Maelstrom, which figures in one of Edgar Allan Poe's weird stories and in Jules Verne's "Twenty Thousand Leagues Under the Sea," is off the southern tip of this archipelago.



Photograph from Dr. Hugh M. Smith

A FISHING FJORD IN THE LOFOTEN ISLANDS

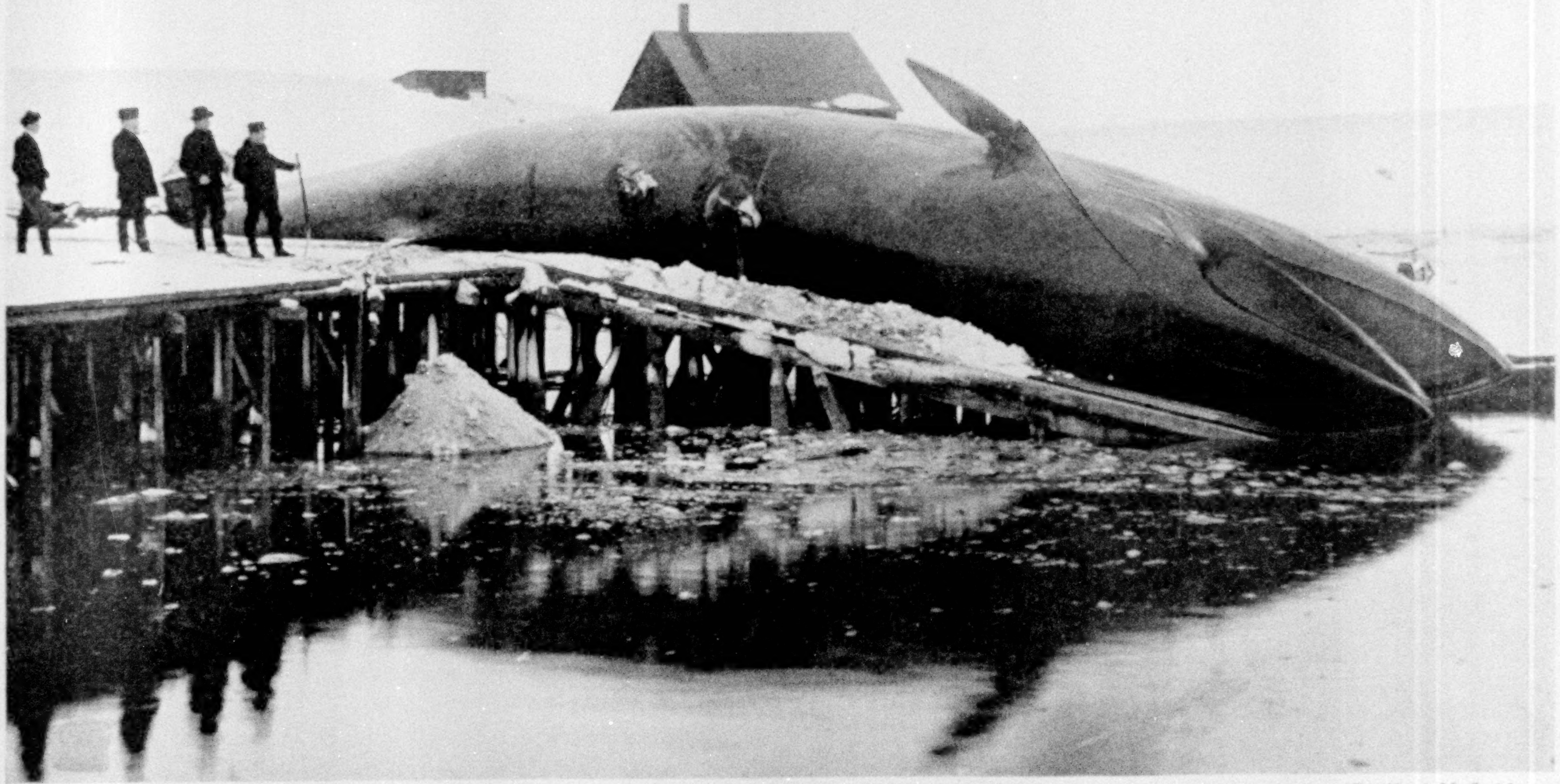
Many hundreds of boats crowd into a small area. The larger sailing vessels buy the fish and transport them to markets in the larger cities, and the smaller boats offer their catches for sale. Most of the fish are split open, salted, and spread out on the rocks to dry. After their tails have been tied together, they are hung upon wooden frames until the following June, when they are shipped to Bergen. The heads are dried and pulverized for fertilizer.



Wide World Photograph

REINDEER FORDING THE RY STRÖM, NEAR TROMSÖ

The Ry Ström, a strait and rapid between Kvalöy and the small island of Ryö, is barely 550 yards wide at its narrowest part, and is full of whirlpools when the tide is strong. Tromsö, on the island of that name, has a brisk trade created by the fisheries of northern Norway and the sealing expeditions dispatched annually to Spitsbergen and Nova Zembla. The Lapp settlement near Tromsö keeps a large herd of reindeer, whose thick, rich milk is an important food.



Photograph from Dr. Hugh M. Smith

A BIG CATCH

Whaling is an important industry among the Norwegians, their best hunting ground being the Atlantic Ocean, which recently yielded fishermen 10,000 animals in one year. Whale oil is now hardened by a new process into a creditable butter and margarine, which saved the country from the fat famine that afflicted most of northern Europe during the World War.

Photograph by A. B. Wilse

THREE SPECIMENS OF A LOFOTEN CATCH

The Lofoten fisheries were famous before William the Conqueror landed in England. When the cod, coming in from the depths of the Atlantic, swarm about the banks, they are said to be so dense that they move in serried lines from 100 to 160 feet deep. The islands are mainly bare rocks, with occasional patches of thinly scattered soil, but they are famous for their wild beauty.

called homeliness: there are the family groups on the pier, chatting and laughing; the welcome songs and waving flags of Norwegians greeting compatriots or relatives from the United States, and the pleasant sights in the city streets.

One is not even oppressed by the fjords. They have an air of protection about them, and the schoolboys whom one meets are quite eager to show off their few words of English.

### THE COLOR OF NORWAY

When I write the word "Norway" I recall the color of aquamarine, or of snowy icebergs having a translucent, bluish tint, because in a group of symbolists in Paris, at a time when certain French poets believed that every word has its color, one of the most distinguished of them gave these tints to Norway.

Now, the colors of Norway are not the hard hues of the symbolist. They are the red of pleasant fires, the blue of familiar skies, and snow which adds to the enjoyment of life.

It is related of a tourist that he penetrated into one of the lonely farms, or *gaarde*, where the sun is seldom seen. He met there a Norwegian boy of perhaps twelve years of age, who was earnestly studying a tattered Italian grammar. Through his interpreter, the tourist asked why.

"We Norwegians," the boy said, "all choose a land to go to; my grandfather went to Italy and came back here. There was too much sun in Italy; it must be terrible to have the sun all the time."

It was in the early winter, and the tourist asked, "But would you stay away from your own country a long time?"

"Oh, no," said the boy, "I should always come back for Christmas, for Christmas here is like heaven!"

The tourist was from Los Angeles.

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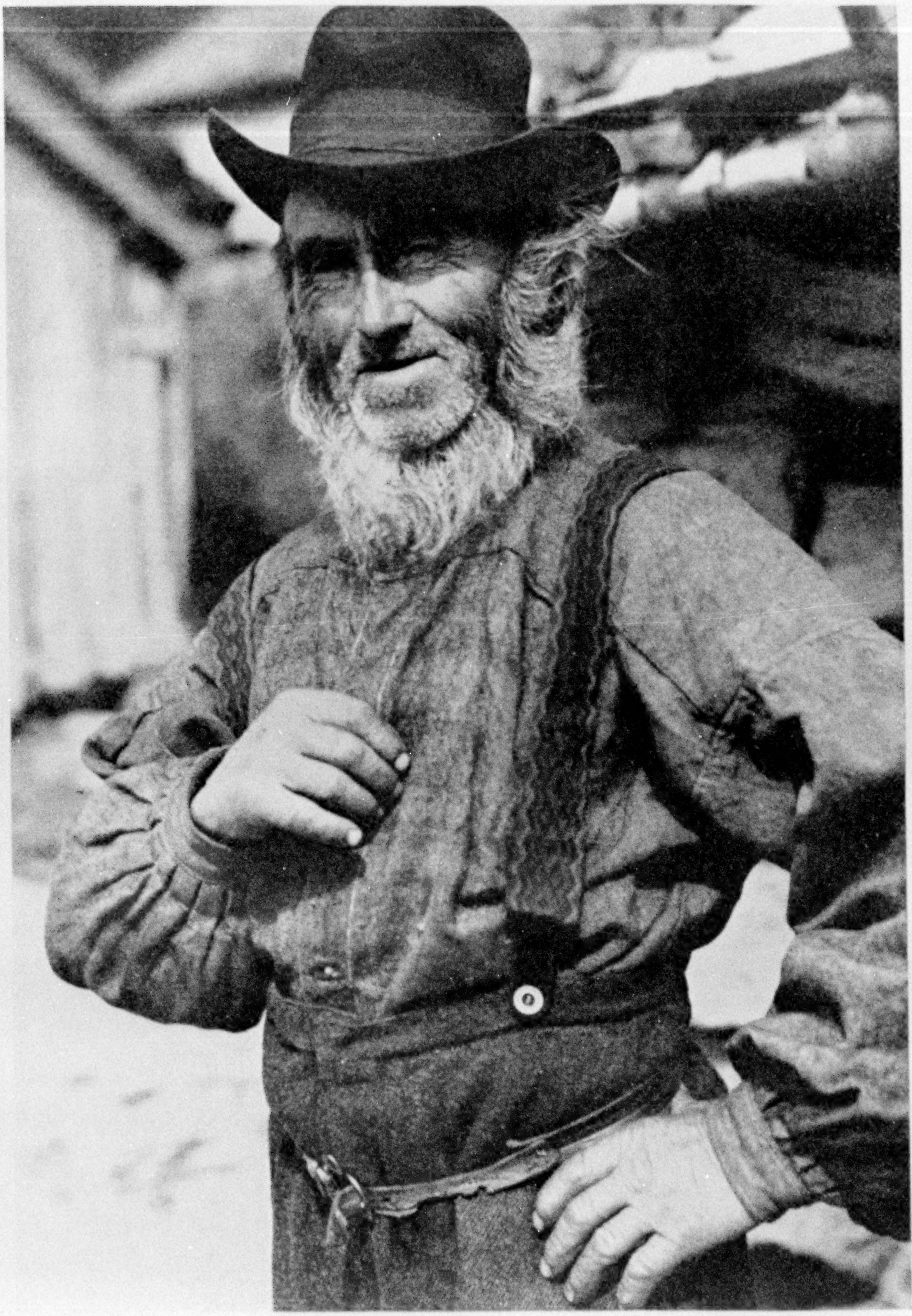

Photograph from Frederick Simpich

A NORWEGIAN SKIPPER

The rugged, island-fringed coast of Norway is one continuous series of sheltered harbors for thousands of miles, leading up into the Arctic Circle—a factor which has been instrumental in developing a nation of sea-rovers and fishermen. The catches of cod, herring, mackerel, and salmon brought into Bergen put that city among the foremost fish markets of the world.

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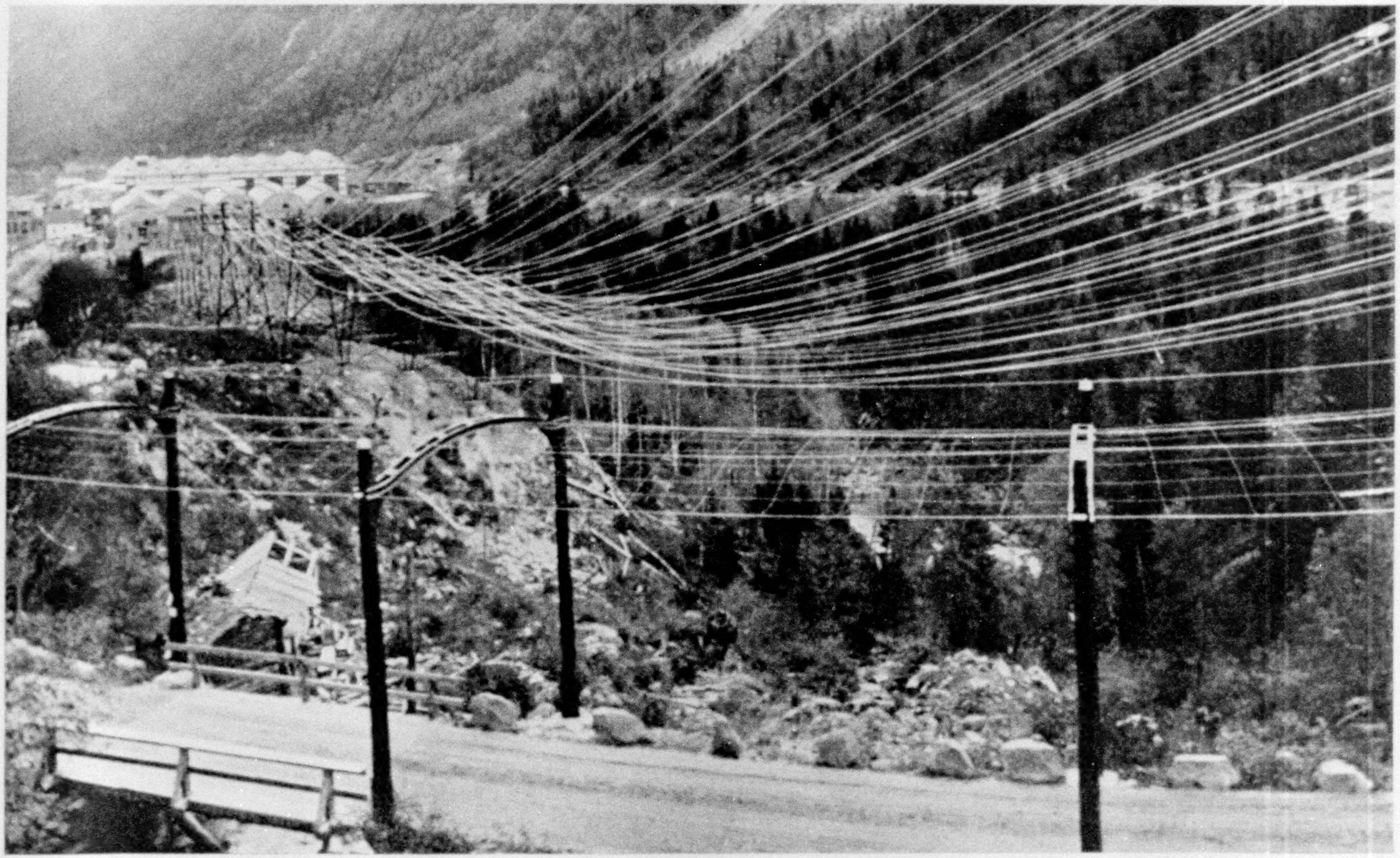

© E. M. Newman

THE POWER OF A GREAT WATERFALL CARRIED ON WIRES: THE RJUKAN POWER PLANT IN THE DISTANCE

The waters of the Mjösvand, which once beautified the countryside with a magnificent waterfall, are now conducted through a conduit along the hillside and over the turbines of the Rjukan power plant, utilizing the major portion of the 250,000 horsepower which the cataract once possessed to make nitrates from the nitrogen of the air (see illustration, page 659).

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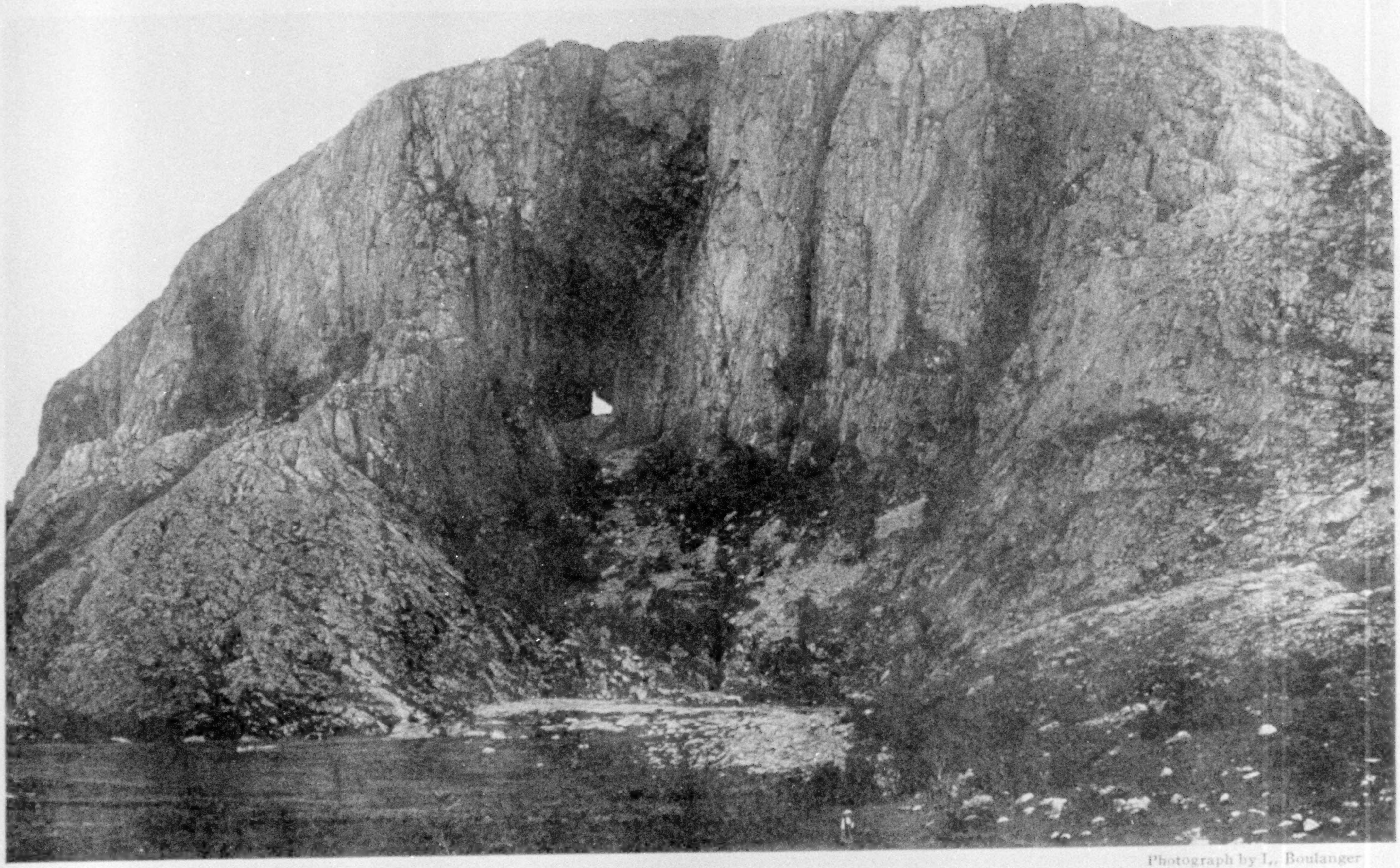


Photograph by L. Boulanger

A MOUNTAIN PIERCED BY A NATURAL TUNNEL

The Torghatten, so called because it resembles a Norwegian market hat floating on the sea, towers above Torgen, the island on which it is located. The *Hullet*, or natural hole through the mountain, 407 feet above the sea, forms a gigantic telescope, to which tourists climb for a view of the countless islands and rocks in the outlying waters.

Photograph by A. B. Wilse

"CROSSING THE BAR": ON A PASSENGER STEAMER IN ONE OF THE DEEP WESTLAND FJORDS

"Would you not," he asked, "like to bask in the sun on Christmas day?"

The boy seemed righteously indignant. "That would be no Christmas at all," he said.

His father and mother, who seldom saw the sky except through clefts in the mountains, joined him. The father spoke a little English, which he had learned from books. He laughed when the conversation was reported to him.

"My little Eric," he said, "cannot imagine a sunlit Christmas." And he went into his wooden house and brought out a sketch on rough paper, made by Eric, which showed the Nativity with a shepherd approaching the manger on skis.

The condescending attitude of the Swede of former years toward the Norwegian was met by a firm belief on the part of the latter that, while he might not be entirely superior, he was *himself,* and that consequently, the opinion of an outsider did not matter at all.

The Norwegian tells with amusement of the American who said to the Swede: "You have no great cities like Minneapolis or St. Paul and no great waterfalls such as we have in the United States."

The Swede proudly enumerated Stockholm and half a dozen cataracts.

"But you have no Indians!" said the American triumphantly.

"Oh, yes; we have," retorted the Swede,

"but we call them Norwegians."

This old story, which emigrated from America many years ago, is not resented by the Norwegians at all. I have tried it several times myself in the country districts.

Norway never loses an opportunity to present herself to the world in the best light, and the Norwegians in every part of the world insist, without undue pomp or ceremony, upon following the scriptural injunction not to hide their light under a bushel.

### SARCASM DOES NOT TOUCH THE NORWEGIAN

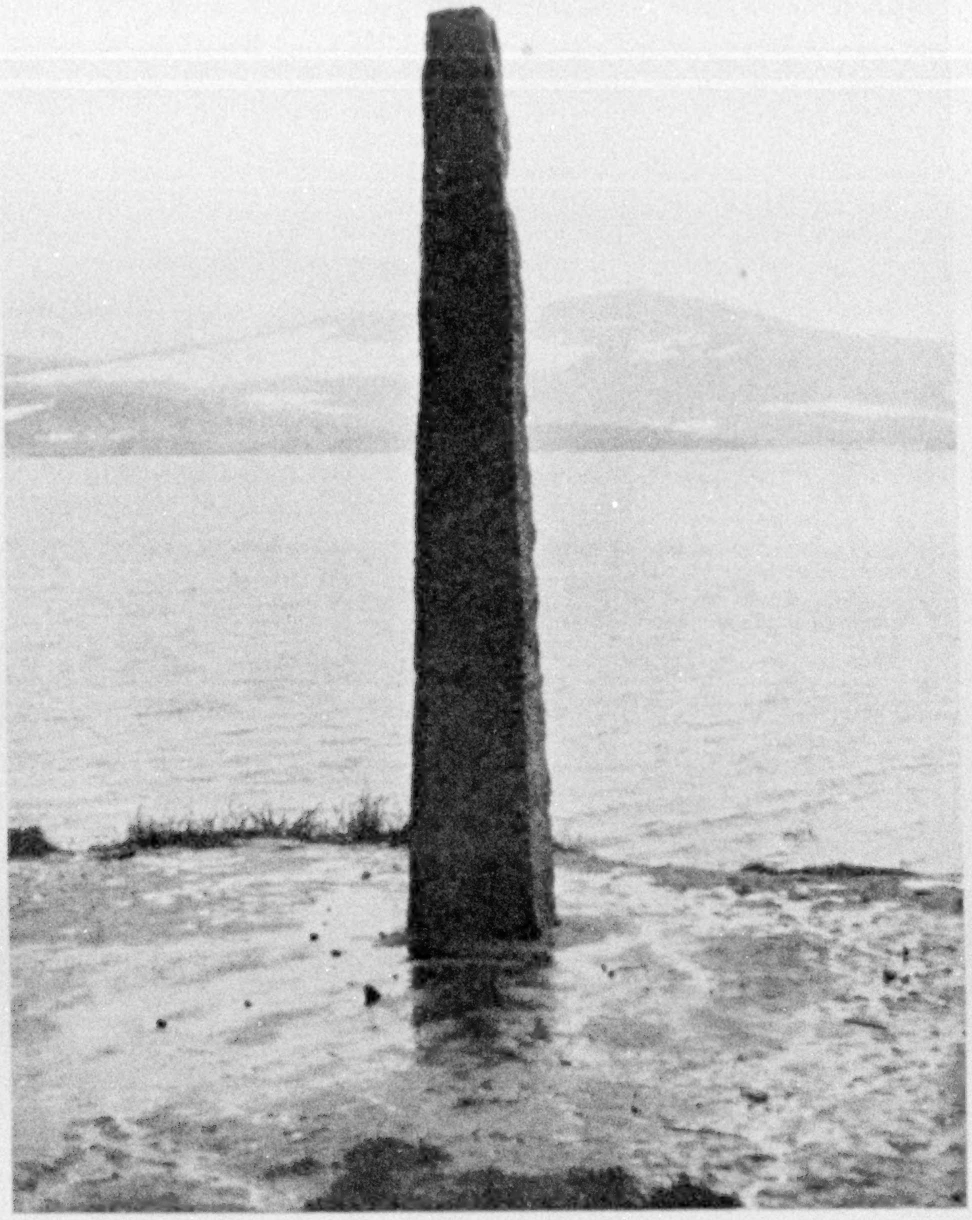
Sarcasm does not easily touch the Norwegian, who is, as a rule, very sure of himself. This self-assurance is sometimes a temptation.

There was one mighty hunter and a great singer of fragments from old Norse songs who was never tired of chanting the virtues of the Norwegians. He was, strange as it may seem, a devout prohibitionist and of the most Calvinistic denomination of Lutherans. He believed that all drinkers were bound for perdition. He accepted the ancient heroes of the sagas, who reveled in mead, because they were staunch pagans and knew no letters.

"How is it," I said, "that the Danes in Copenhagen say that nearly every drunken man seen in their streets is a Norwegian, who comes over to that city in order to fill himself with *braendevin?*"

"It may be true," said the old hunter calmly, "because a Norwegian would be ashamed to be seen drunk among his own people."

Whether he really believed it or not, he met every insinuation as to the existence of any defects in his own people by turning these defects into virtues.



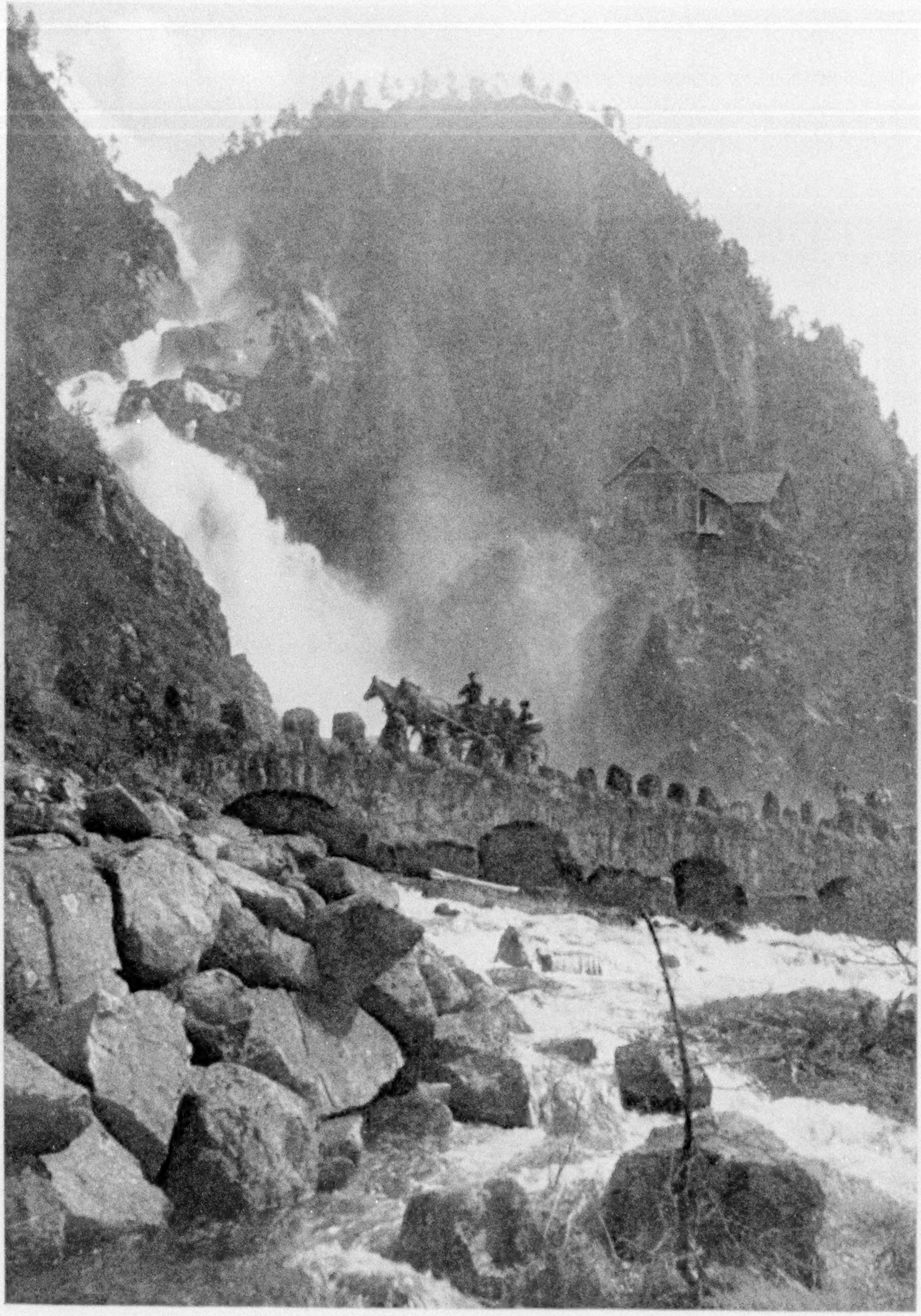
Photograph by Donald McLeish

AN OBELISK AT FINSE ERECTED IN HONOR OF CAPTAIN ROBERT F. SCOTT

At an altitude of 4,010 feet, amid Arctic surroundings, stands this monument to the English Antarctic explorer. It is inscribed with the names of Captain Scott, Dr. Wilson, Captain Oates, Lieutenant Burrows, and P. O. Evans, all of whom perished on the return journey from the South Pole in 1912. It was in the Norwegian mountains near Finse that Captain Scott and his companions practiced with motor sledges prior to the trip.

### TWO UNHAPPY EXILES

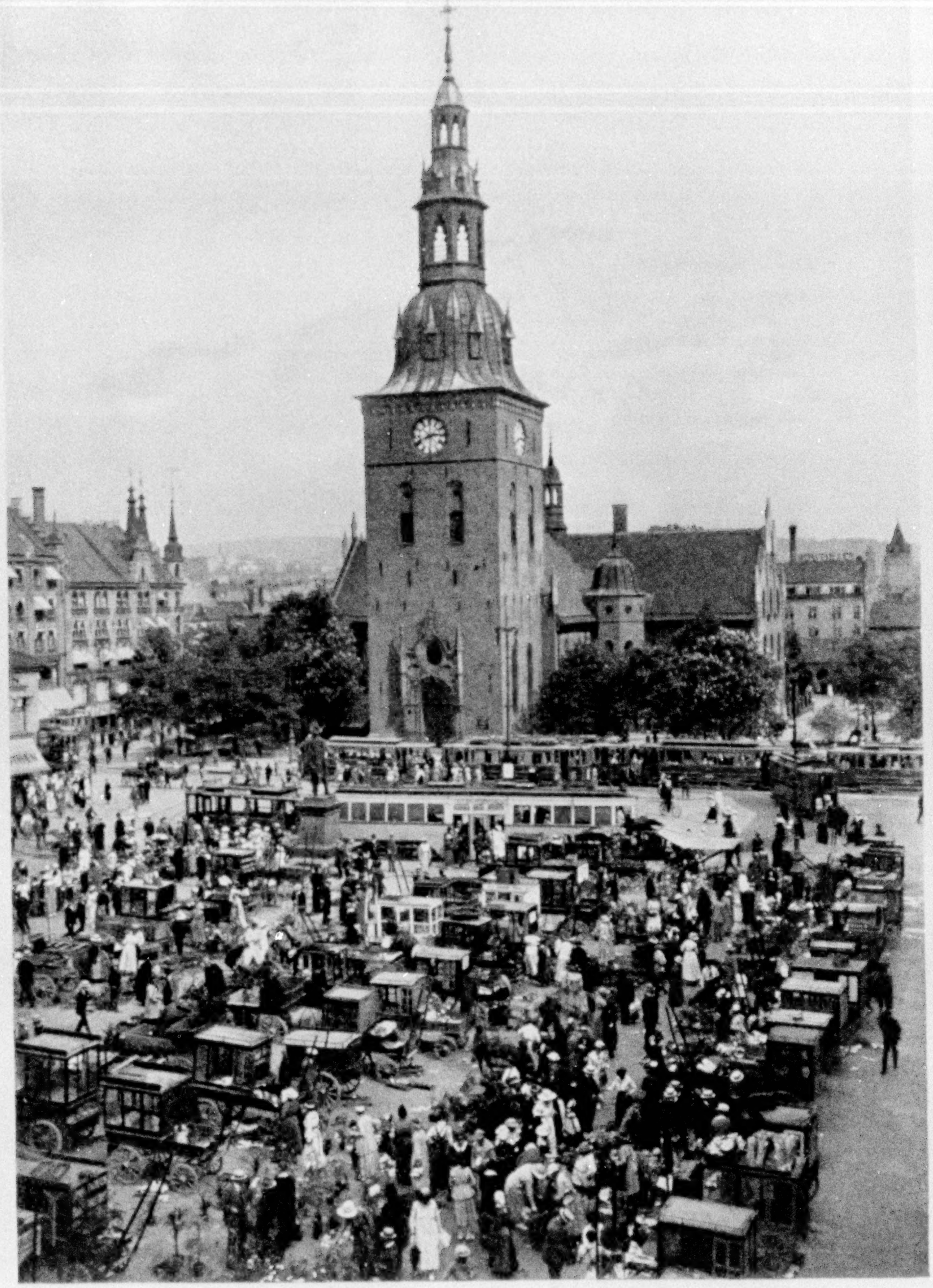
The Norwegian may be found anywhere. The boy among the mountains,



Photograph by A. B. Wilse

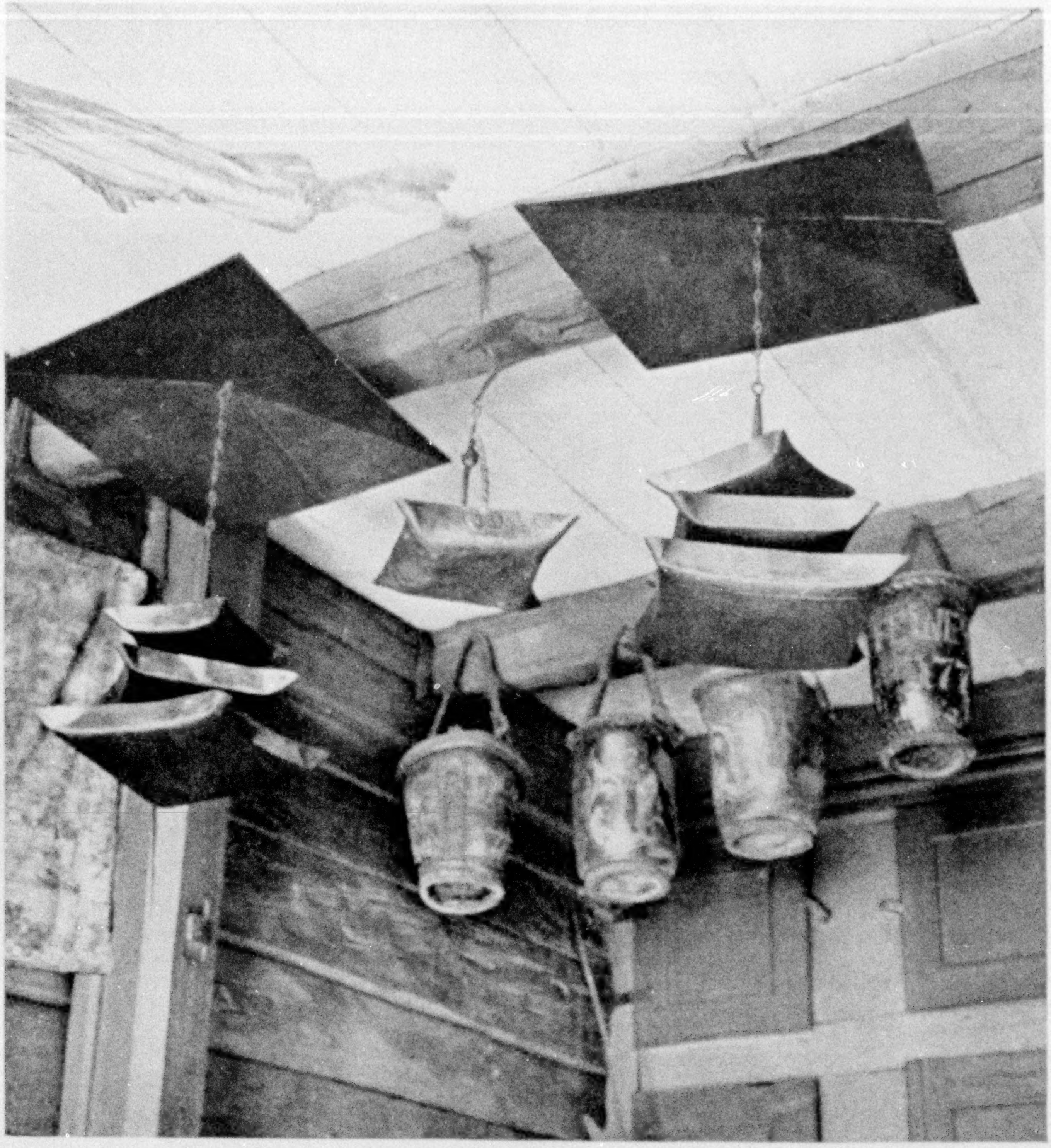
ONE OF THE MOST BEAUTIFUL OF NORWEGIAN WATERFALLS, THE LAATEFOS

The Laatefos and the Skarsfos tumble over the hillside from Sandven Lake and mingle their waters in their descent. The black rocks behind them accentuate the whiteness of their foam and spray.



THE FLOWER MARKET OF CHRISTIANIA

Flowers are for sale in Norway every summer day, but in nearly every large city of the country one day of the week is the flower day of the markets, and about the open square portable greenhouses tempt the buyer with fresh blooms of every shade and fragrance.



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ANCIENT OIL LAMPS OF NORWAY IN THE HANSEATIC MUSEUM OF BERGEN

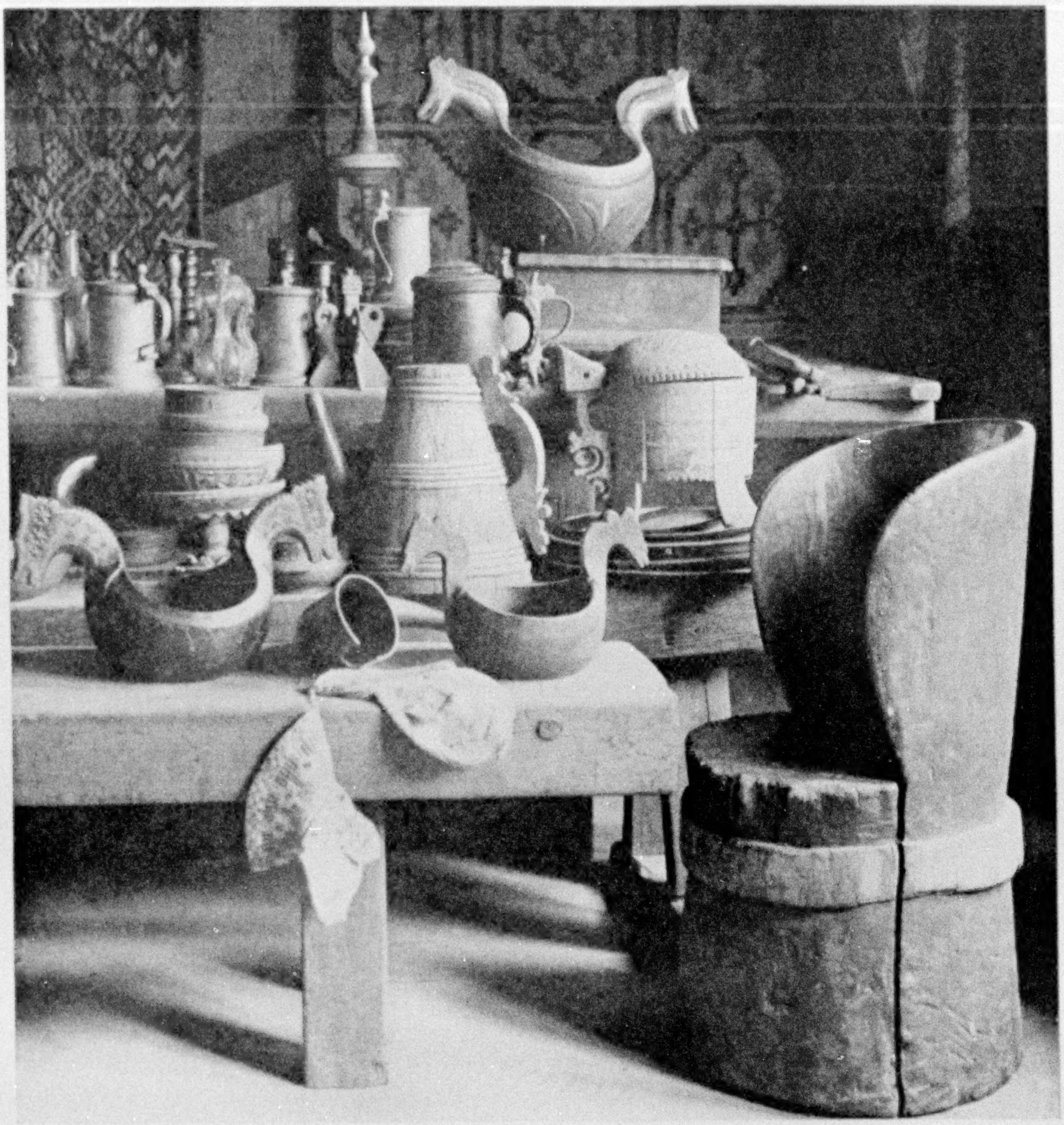
The trays were filled with fish oil, and wicks in the corners of each tray furnished the light. A three-tray lamp became a candelabra of twelve lights. The Museum contains a valuable collection of furniture, weapons, and other objects of the latest Hanseatic period.

with his Italian grammar, was simply following the urge of his race.

It is true that the pine tree longs for the land of the palm, and the palm tree for the land of the pine. Heine has forever crystallized this truth in one of the loveliest of his lyrics; but I think two of the unhappiest beings I ever met were in Louisiana, in the month of May—late in May. They had earned their living by picking cotton during the previous summer, and they described their experience as Dante describes some parts of the infernal regions.

The worst was over, but in order to get money enough to leave this "burning place," as they described it, they had made a contract with a builder until June. Even in May they reminded one of those unhappy dogs whose tongues hang out in the heat. Their one hope seemed to be to see the falling snow again. They hated the perpetual sunshine.

Their other objection to Louisiana and



Photograph by Donald McLeish

DOMESTIC UTENSILS, DRINKING BOWLS, AND A CHAIR OF VIKING DAYS

The old sea lovers of Norway fashioned their double-handled drinking vessels like boats. The Bergen Museum contains an excellent collection of these Norse antiquities. The chair was cut in one piece out of the trunk of a tree and is of a type still in use in the country districts.

a plantation was that there was not enough to eat, although if there is one State which seems to provide most bountifully for its inhabitants it is Louisiana.

They abhorred the dishes of the land; okra filled them with an unutterable disgust and the cheese offered them was looked on as an evil substitute for the beloved goat's cheese of their country.

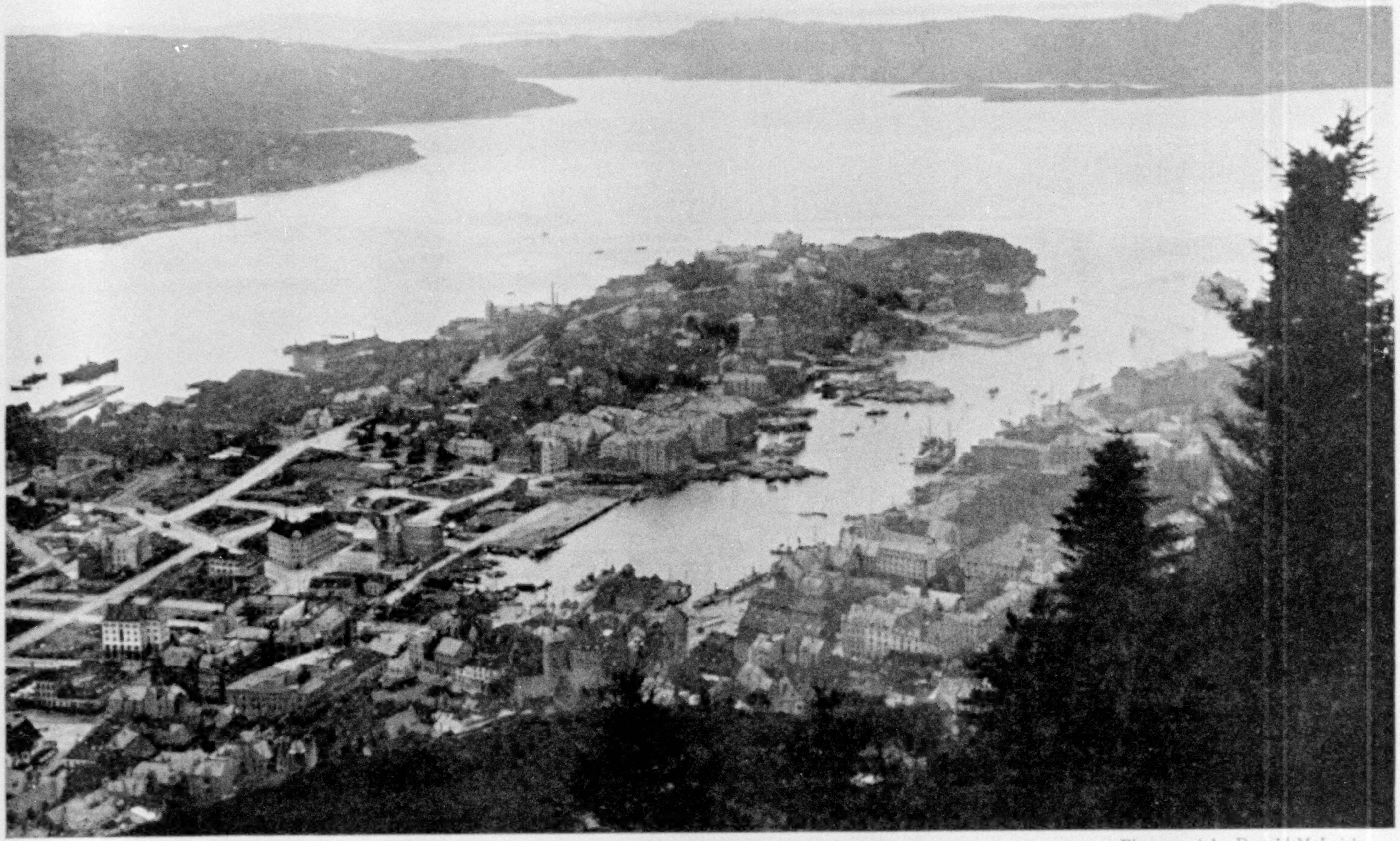
"In Norway," they explained, "even on a poor farm, we have six meals a day." And they did not exaggerate.

The worker on the gaard expects coffee with *smörbröd* at 5 o'clock; at 7:30 salt meat is welcome; at about 11 o'clock his principal meal is ready; he takes his coffee at 1 p. m.; at 4 the delicious *gjetost,* sometimes called *"mysost,"* the goat's cheese, dreams of which reconciled these two lonely Norwegians to life.

### A REBUFF FOR THE KAISER

The German Emperor spent more than twenty-five seasons in Norway; but,

XUM



Photograph by Donald McLeish

BERGEN FROM THE FLOREN HILL

The voice of the past continuously speaks to the visitor in Bergen, where one finds the Viking, the Hansas, and the modern mercantile marine represented in the port. Women in Paris creations rub elbows with peasants in their native costumes, and crude country carts move through the streets by the side of modern taxis. The city also enjoys the unenviable reputation of being the wettest in Europe, its rainfall averaging about 72 inches annually. In the background are the mountainous islands which shelter the harbor from the North Sea.

Photograph by A. B. Wilse

A PLEASANT SUMMER PASTIME—BOATING AMID THE THOUSANDS OF ISLANDS THAT FRINGE THE COAST OF NORWAY

outside of his special court, he received no particular marks of reverence from the honest Norwegians. In fact, he had learned not to expect them.

There is a story told of two Norwegians who crossed the path of the Emperor, going from one farm to another, munching bread and herring as they went. The Emperor was alone, his equerry being some distance behind him, engaged with two horses. These peasants were elderly men, white-bearded.

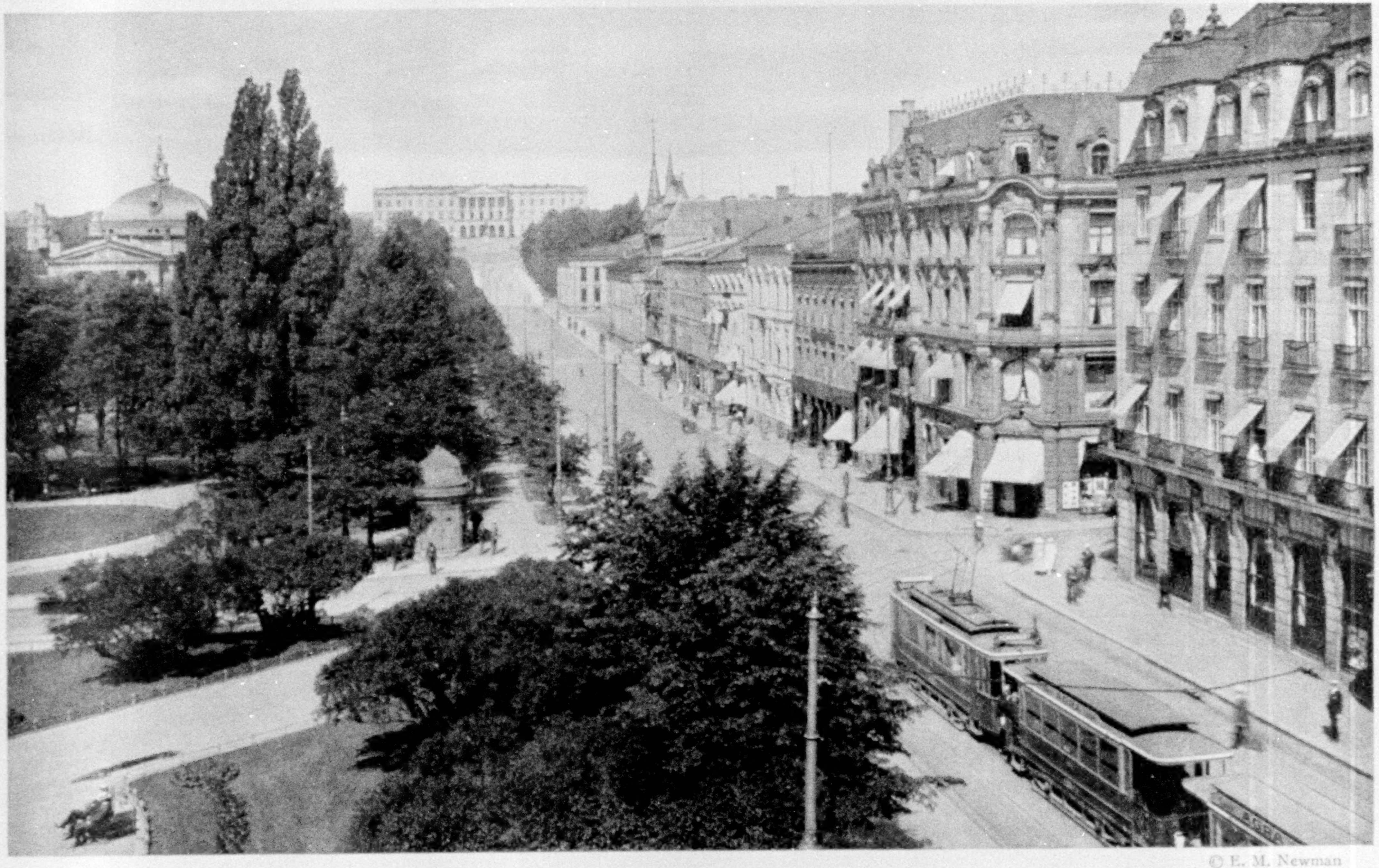
The Kaiser was in the act of examining a shrub and he dropped his glove. As the old men approached, he straightened himself up and glanced meaningly at the fallen glove.

"Pick it up yourself," said the elder of the farmers. "You are younger than I am," and they passed on without the slightest self-consciousness, much to the horror of the equerry, who afterward told the story with bated breath.

### A THRILLING WINTER SPORT—STEERING A "KJELKE"

The traveler in Norway ought by all means, if he can not conquer the ski, learn to steer a *kjelke*. It is a small sled which holds two persons. It is steered by a pole, which may be held under the arm and makes a tail for the kjelke.

The skill of the Norwegian girls in steering these sleds approaches the miraculous. They seem to have the instinct of the mountain goats.



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THE CARL-JOHANS-GADE OF CHRISTIANIA LEADING TO THE KING'S PALACE

Along this main thoroughfare of the capital, extending from the chief railway station to the palace, are the Stor-Torv, or great market; the Church of Our Savior, constructed in 1697, and the Norwegian parliament houses, from which this photograph was taken.

Photograph by A. B. Wilse

A DAUGHTER OF THE SNOWS

Norwegian women are irrepressibly energetic and splendidly fearless. Many of them excel in skiing, sailing, mountain climbing, and various other out-of-door sports. Their industry and independence of spirit lead them into nearly every field of professional and commercial endeavor.

Photograph by P. O. Bugge

COLOSSAL BRONZE STATUE OF FRITHJOF, LEGENDARY VIKING WAR-LORD, AT BALHOLM

A very polite young American, versed in sports, happened to meet a young girl about to join a procession of torchbearers one snowy evening in Christiania. She seemed rather slight and fragile, in the twilight, and very respectfully he asked, "May I assist you?"

It seemed to him a foolhardy thing that a young girl should start out in falling darkness in such a doubtful vehicle as the kjelke, which he had never seen before.

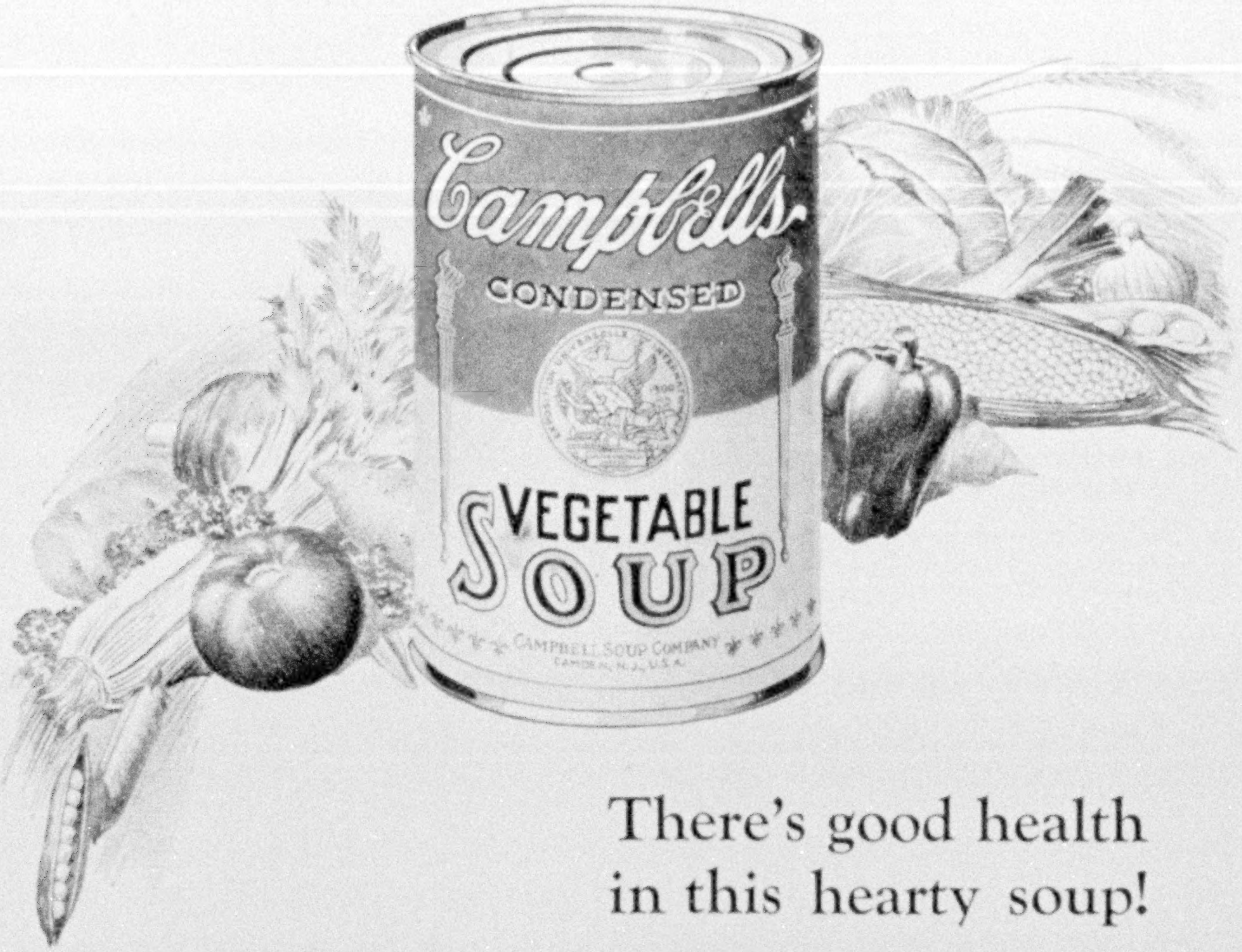
He evidently did not see what the novelist would call her "enigmatic smile."

"Oh, yes," she said in English. "Yes; get in."

He took the other seat with the feeling and the air of protector. He had played football at Harvard. The kjelke started. It joined with tremendous swiftness the procession of sleds. Skirting precipices, within an inch of gulfs, up and down; almost with the speed of a locomotive, the kjelke flew. He held on with all his might. It seemed to him as if his fur cap would be at any moment torn from his head. He confessed that even in the trenches he had never felt the doubt and fear that oppressed him.

After what seemed to be many hours of horror, the kjelke stopped at the end of a Christiania street, surrounded by torch-bearing and singing students. The young lady gave him her hand and said sweetly, in his native tongue, "May I assist you?"

He never saw her again, and he confessed very ungallantly that he never wanted to see her again. No sport known in England or in America prepares one adequately for this winter sport in which the Norwegians have acquired unexampled skill.



# There's good health in this hearty soup!

Luncheon
Dinner
Supper

There's the iron of the green vegetables.

And the valuable mineral salts.

And the richness and vigor of fine beef broth.

And the wholesome nutriment of selected cereals.

And those by no means unimportant ingredients which make good food attractive to the appetite—fresh herbs and dainty seasoning skillfully blended.

Fifteen different vegetables. Thirty-two ingredients in all.

As healthful a dish as you could eat for the lighter meals, such as luncheon or supper. Real substantial food with your dinner or at any time.

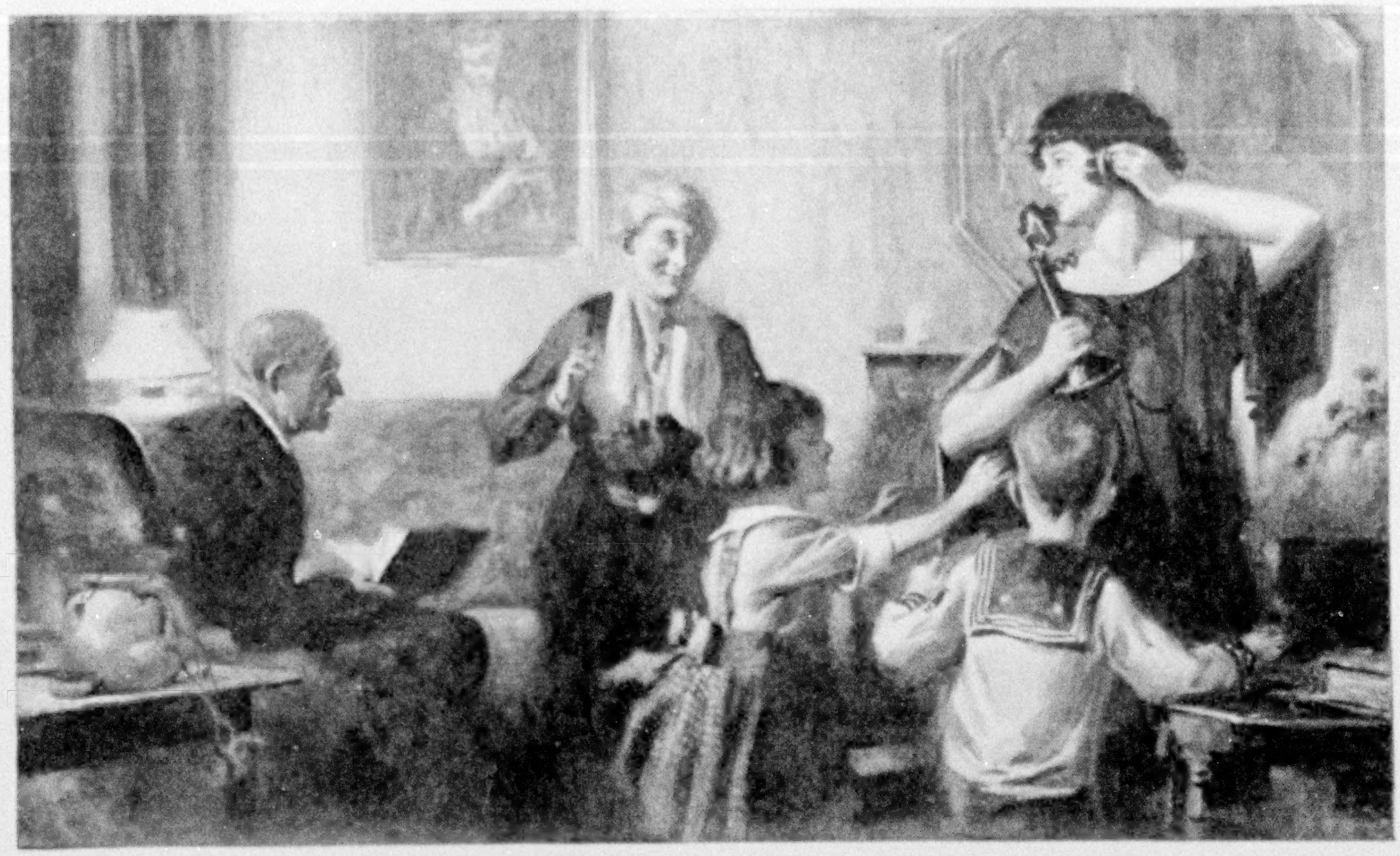
How the children like it!

21 kinds 12 cents a can

I never fail to set my sail
For where the eating's hearty;
I always feel I've had a meal
When Campbell's leads the party!

**Campbell's SOUPS**

LOOK FOR THE RED AND WHITE LABEL



# The Road to Home

Though written faithfully, his letters from home seemed to have had a way of arriving at his hotel in one city just after he had left for the next—and of never catching up.

Three weeks passed—business conferences, long night journeyings on sleepers, more conferences—with all too little news from home.

Then he turned eastward. In his hotel room in Chicago he still seemed a long way from that fireside in a New York suburb. He reached for the telephone—asked for his home number.

The bell tinkled cheerfully. His wife's voice greeted him. Its tone and inflection told him all was right with the world. She hardly needed to say, "Yes, they are well—dancing right here by the telephone. . . . Father and mother came yesterday. . . . Oh, we'll be glad to see you!"

* * * *

Across the breadth of a continent the telephone is ready to carry your greetings with all the conviction of the human voice. Used for social or business purposes, "long distance" does more than communicate. It projects you—thought, mood, personality—to the person to whom you talk.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
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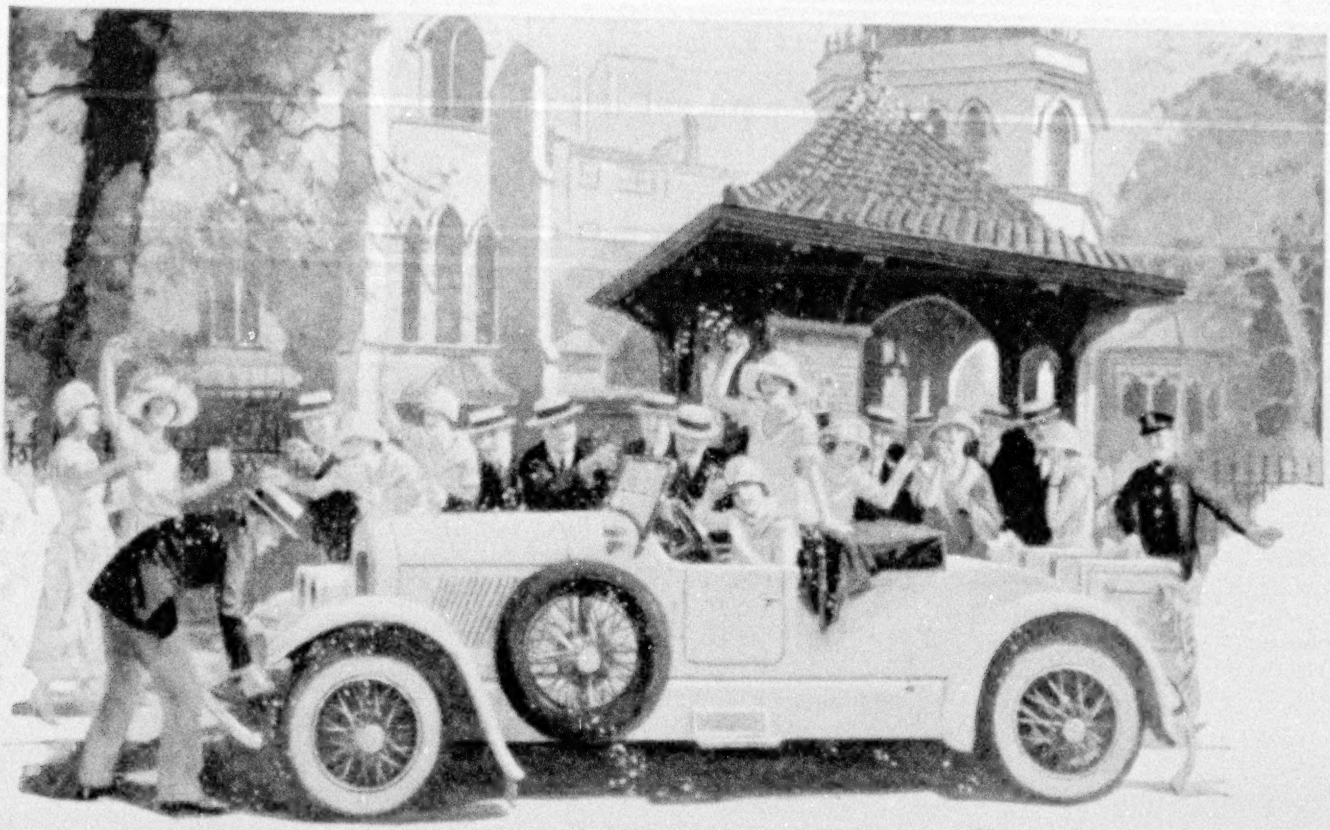
*One Policy, One System, Universal Service*



THIS HAPPENED TO MR. J. M. G.
*—and then he got a Philco*
What experiences—embarrassing or dangerous—have you had with just ordinary batteries?

# "Humiliating? Well, rather!
## *—and then I got my Philco!"*

"We were married in a certain well-known little church in New York. * * * In the excitement of making a quick get-a-way, I stalled the engine. Then my battery 'died.' * * * Humiliating? Well, rather! Right there I resolved it wouldn't happen again. And then I got *my* Philco!"—J. M. G., Ottawa, Canada.

Whether on traffic-jammed streets, over railroad crossings or on lonely roads at night—*you can depend on a Philco.* No humiliating experiences. No hand-cranking ordeals. No battery "flunking" where it means distress or actual danger.

Everybody can now own a full-size full-powered battery made by Philco. Exchange prices range from $15.95 up, depending on type and geographical location.

The famous oversize type, equipped with Philco Slotted Retainers and guaranteed for two years, is the longest-life, lowest-cost-per-month-of-service battery built. And it now costs you less to buy than ever before. Look in your phone book for "Philco Battery Sales and Service" or write us.

Philadelphia Storage Battery Company
Philadelphia

FOR RADIO—Use Philco Rechargeable Batteries for distance, volume and clearness of reception. The glass case types are a revelation—

1. They are acid-tight and when charged with a safe, low-current Philco Charger *may be used inside the finest cabinets.*
2. The built-in Charge Indicator shows at a glance, *without the use of a hydrometer,* how far the battery is charged or discharged.
3. When using a Philco Charger a mere throw of a switch is all that is necessary to charge the battery or to re-connect it to the receiving set.

| | |
|---|---|
| Battery for low voltage peanut tubes | $8.00* |
| Philco Single Charger | 6.60* |
| For standard 5-6 volt tubes | 16.00* |
| Philco Double Charger | 10.00* |

Double-pole throw-over switch included free with either combination of battery and charger.

*East of the Mississippi River.

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Farm Lighting
Radio
Electric Truck
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Passenger Cars
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Auxiliary Power
Marine
Isolated Plant
BATTERIES

**PHILCO** DIAMOND GRID **BATTERIES**

Vladimir de Pachmann *loves* the Baldwin piano. Through the medium of Baldwin tone, this most lyric of contemporary pianists discovers complete revealment of his musical dreams. For a generation de Pachmann has played the Baldwin; on the concert stage and in his home. That loveliness and purity of tone which appeals to de Pachmann and to every exacting musician is found in all Baldwins; alike in the Concert Grand, in the smaller Grands, in the Uprights. The history of the Baldwin is the history of an ideal.

*". . . . It cries when I feel like crying, it sings joyfully when I feel like singing. It responds—like a human being—to every mood. I love the Baldwin Piano."*

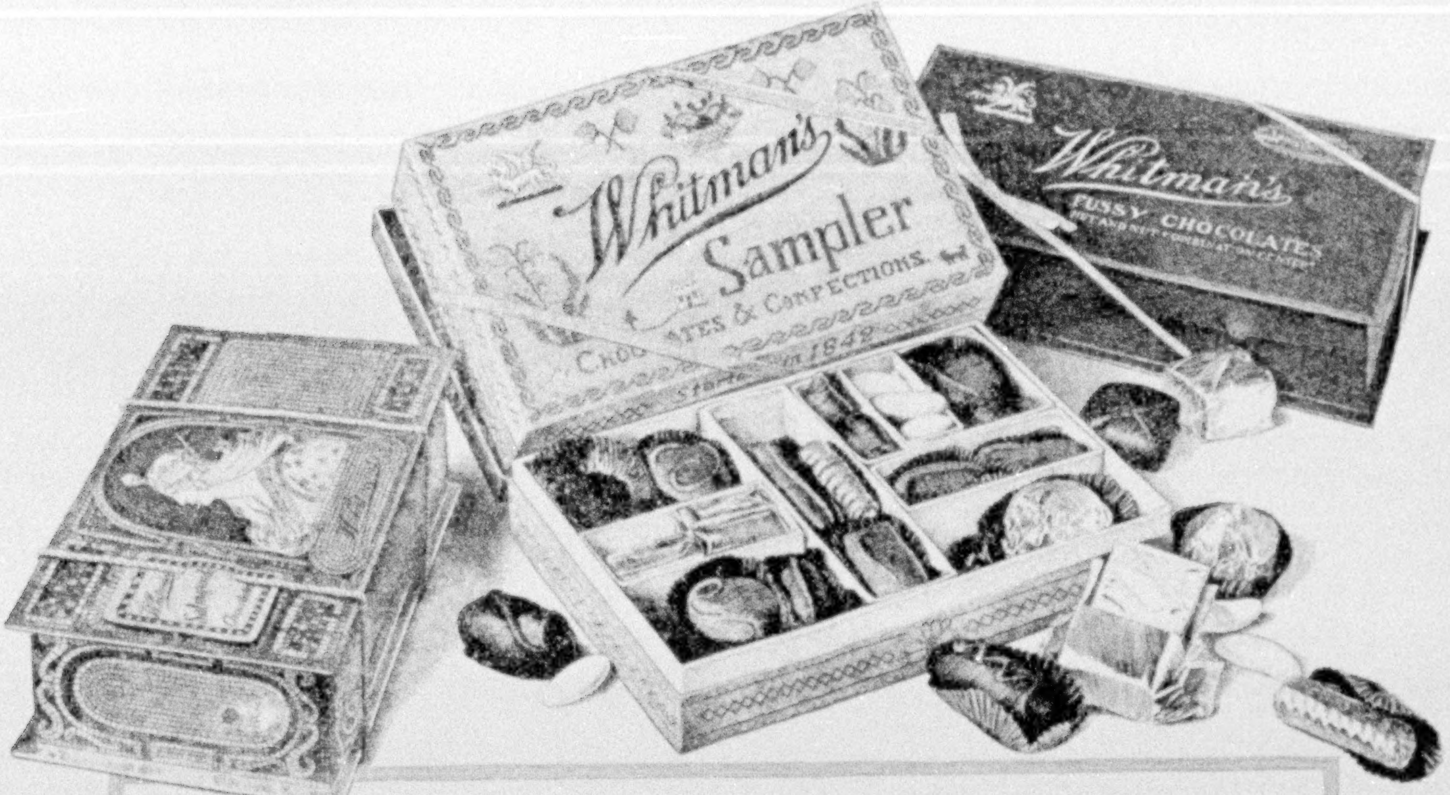
V. de Pachmann.

# Baldwin

You will probably find a Baldwin dealer in your city. If not, a request by mail to the nearest Baldwin showrooms, as listed below, will bring you complete information regarding models and prices.

THE BALDWIN PIANO COMPANY

Cincinnati Chicago New York Indianapolis Louisville St. Louis Denver San Francisco Dallas


Whitman's
Sampler
Chocolates & Confections
1842
Whitman's
Fussy Chocolates

# Chocolate Classics

Comparisons cannot be avoided in considering chocolates. All the candy assortments shown here are classics—they fall naturally into the highest class, a group of noble sweets.

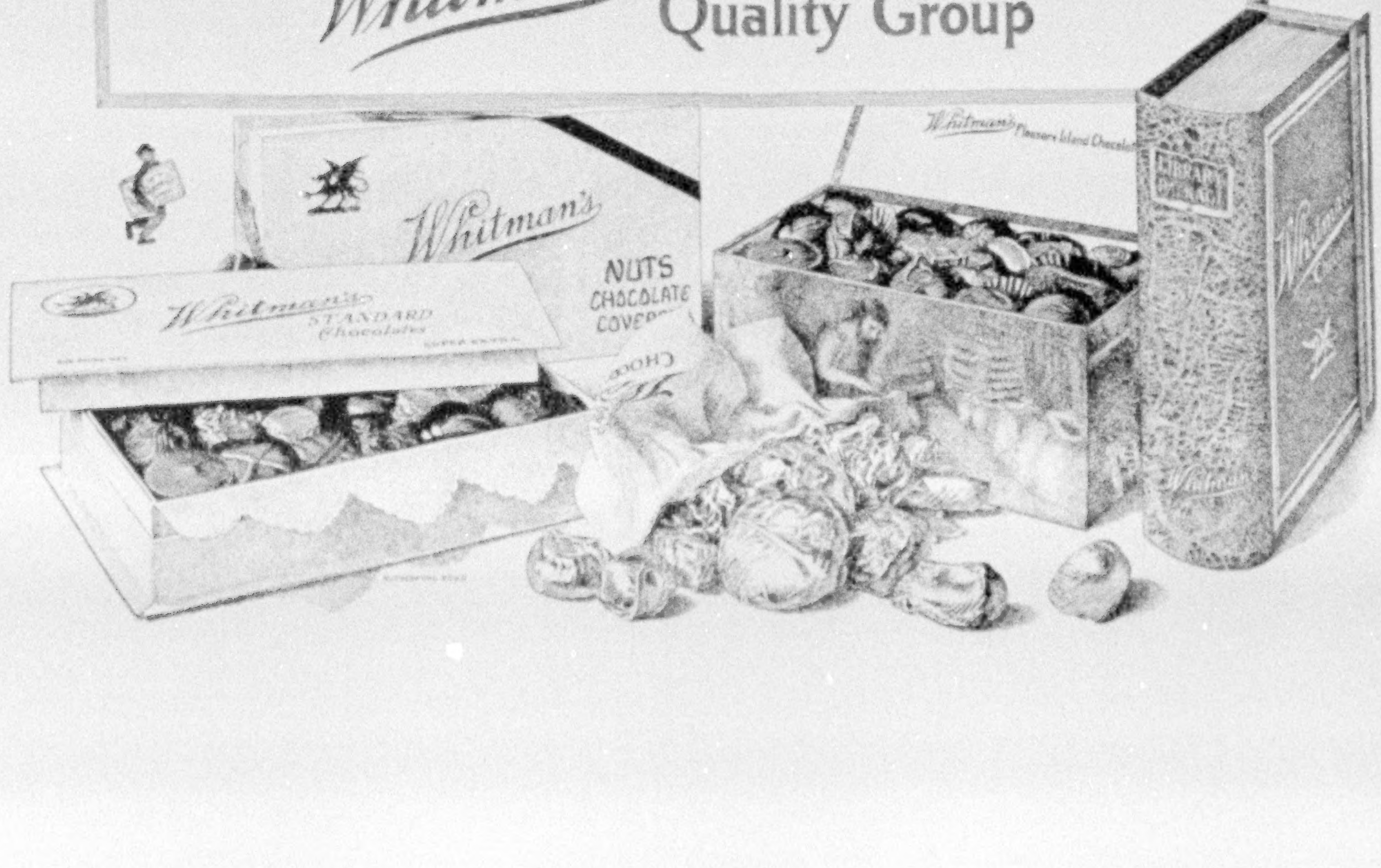
Each package of Whitman's is planned and built up, piece by piece, in answer to a definite demand from candy lovers. The assortments are as different as the boxes.

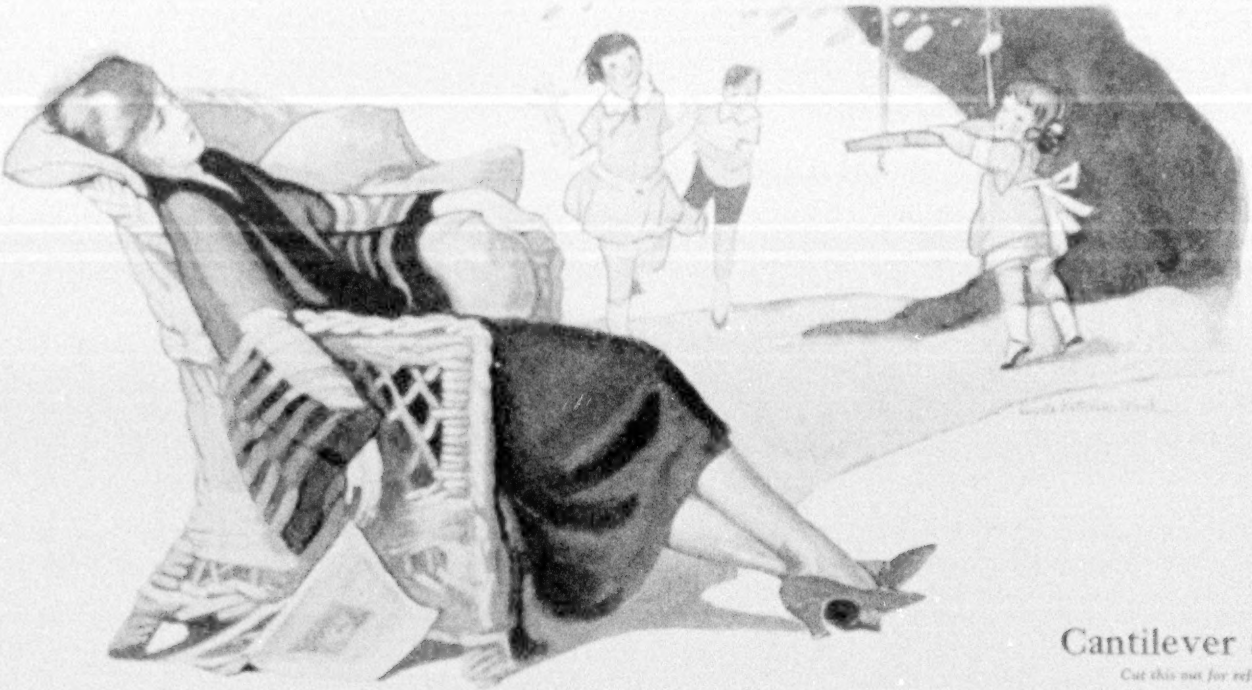
Get acquainted with the *variety* of the Sampler, the *romance* of Pleasure Island, the *originality* of Salmagundi, the *richness* of Nuts, Chocolate Covered, the selected chew-y centers of the Fussy Package, the wide range of chocolates in the Standard Package, the choice and exclusive contents of the Library Package.

There's a little book with colored illustrations that helps in selecting candy for any occasion. It is called "On Choosing Chocolates." Write us to send you a copy.

STEPHEN F. WHITMAN & SON, Inc., Philadelphia, U. S. A.

**Whitman's Quality Group**


Whitman's
Nuts
Chocolate
Covered
Whitman's
Standard
Chocolates
Whitman's Pleasure Island Chocolates
Library Package
Whitman's

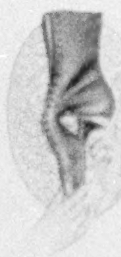


# Feet *do* Make a Difference

TIRED and listless, she sinks back in a chair to envy little children at play, to wish for their energy, their easy activity. Not so long ago, she, too, was joyously active. Her feet were young. And they can be again.

Many women who are spending large sums of money to prolong youth, forget how greatly the wrong type of shoe can age them. Wrinkles and "that tired look" are often the result of a subconscious protest against shoe-bound feet. Your doctor will tell you that many cases of suspected rheumatism, headache, backache and undue fatigue are caused by rigid, unnaturally shaped shoes.

Thousands of women have regained active, carefree feet in the Cantilever Shoe. It is flexible from toe to heel. The foot muscles strengthen through exercise in the Cantilever and become better able to hold the bones of the foot in well-curved, springy arches. The flexible arch fits the foot arch snugly, giving gentle, restful arch support.



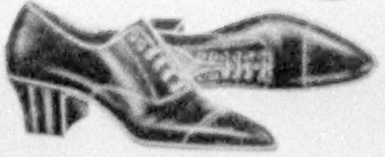
The lines of the shoe are the lines of the normal foot. Your toes have a chance to straighten out in the pleasingly rounded toe of the Cantilever. The well placed, moderate heel takes the strain off the inner and weaker side of the foot.

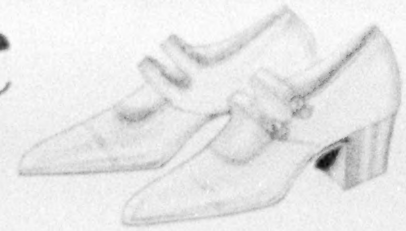
### *Quality Maintained at the Lower Prices*

The reduced prices now in effect make Cantilever Shoes truly economical. They are well made shoes, long wearing, constructed of fine materials on attractive lines. There are trim oxfords and pretty pumps in one-strap, two-strap and twin-strap effects. There are also good looking Cantilevers for men, including an excellent golf shoe with the finest grade of crepe rubber sole.

If none of the stores at the right is near you, write the manufacturers, Morse & Burt Co., 16 Carlton Avenue, Brooklyn, N.Y., for the address of a more conveniently located Cantilever dealer and a booklet on shoes and feet.

# Cantilever Shoe



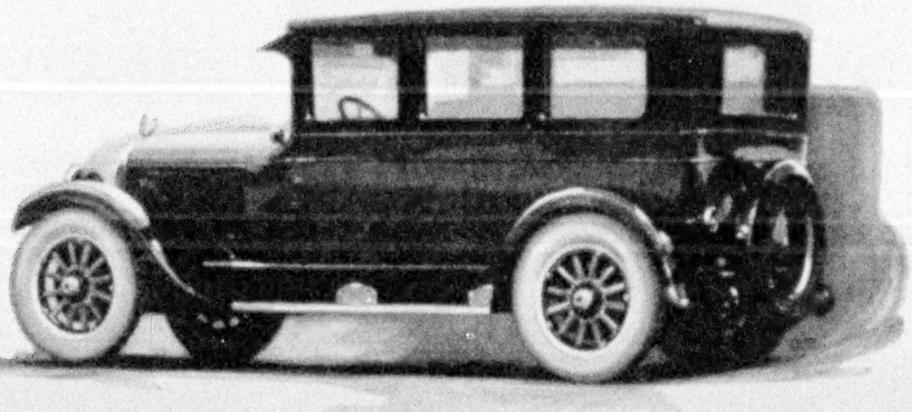


## Cantilever Stores

*Cut this out for reference*

Akron—11 Orpheum Arcade (Main & Market)
Albany—Hewett's Silk Shop, 15 N. Pearl St.
Allentown—907 Hamilton St.
Atlanta—126 Peachtree Arcade
Atlantic City—2019 Boardwalk (near Shelburne)
Baltimore—325 North Charles St. (2nd floor)
Binghamton—Parlor City Shoe Co.
Birmingham—219 North 19th St.
Boston—109 Newbury St. cor. Clarendon St.
Bridgeport—1025 Main St. (2nd floor)
Brooklyn—516 Fulton St. (Primrose Bldg.)
Buffalo—641 Main St. (above Chippewa St.)
Burlington, Vt.—Lewis & Blanchard Co.
Canton, O.—H. M. Horton Co.
Charlotte—226 North Tryon St.
(30 E. Randolph St. (Room 502)
Chicago—1050 Leland (near Broadway)
(815 E. 61st, cor. Drexel Ave. (Woodlawn)
Cincinnati—The McAlpin Co.
Cleveland—1705 Euclid Ave.
Columbus, O.—191 E. Broad St. (at 3rd)
Dallas—Volk Bros. Co.
Dayton—The Rike-Kumler Co.
Denver—224 Foster Bldg.
Des Moines—W. L. White Shoe Co.
Detroit—41 E. Adams Ave.
Duluth—107 West First St. (Near 1st Ave., W.)
Elizabeth—258 No. Broad St.
Evanston—North Shore Bootery
Evansville—310 So. 3rd St. (near Main)
Fort Wayne—Mathias App's Sons
Fort Worth—Washer Bros.
Grand Rapids—Herpolsheimer Co.
Harrisburg—26 No. 3rd St. (Second floor)
Hartford—Trumbull & Church Sts.
Houston—205 Foster—Bank Commerce Bldg.
Huntington, W. Va.—McMahon-Diehl
Indianapolis—L. S. Ayres & Co.
Jacksonville, Fla.—Golden's Bootery
Jersey City—Bennett's, 411 Central Ave.
Kansas City, Mo.—300 Altman Bldg.
Knoxville—Spence Shoe Co.
Lincoln—Mayer Bros. Co.
Long Beach, Cal.—336 Pine Ave.
Los Angeles—505 New Pantages Bldg.
Louisville—Boston Shoe Co.
Lowell—The Bon Marche
Madison—Family Shoe Store
Memphis—28 No. Second St.
Milwaukee—Brouwer Shoe Co.
Minneapolis—25 Eighth St. South
Mt. Vernon, N. Y.—A. J. Rice & Co.
Nashville—J. A. Meadors & Sons
Newark—897 Broad St. (2nd floor)
New Haven—153 Court St. (2nd floor)
New Orleans—109 Baronne St. (Room 200)
New York—14 W. 40th St. (opp. Public Library)
Norfolk—Ames & Brownley
Oakland—516—15th St. (Opp. City Hall)
Oklahoma City—The Boot Shop
Omaha—1708 Howard St.
Pasadena—378 E. Colorado St.
Passaic—37 Lexington Ave.
Paterson—10 Park Ave. (at Erie Depot)
Pawtucket—Evans & Young
Peoria—Jefferson St. (Lehmann Bldg.)
Philadelphia—1932 Chestnut St.
Pittsburgh—The Rosenbaum Co.
Pittsfield—Wm. Fahey's, 234 North St.
Plainfield—M. C. Van Arsdale
Portland, Me.—Palmer Shoe Co.
Portland, Ore.—353 Alder St.
Providence—The Boston Store
Reading—Sig. S. Schweriner
Richmond, Va.—Seymour Sycle
Roanoke—I. Bachrach Shoe Co.
Rochester, N. Y.—257 Main St., E. (3rd floor)
St. Joseph, Mo.—216 N. 7th (Arcade Bldg.)
St. Louis—516 Arcade Bldg. (opp. P. O.)
St. Paul—43 E. 5th St. (Frederic Hotel)
Sacramento—208 Ochsner Bldg., K near 7th
Salt Lake City—Walker Bros. Co.
San Diego—The Marston Co.
San Francisco—Phelan Bldg. (Arcade)
Schenectady—445 State St.
Scranton—Lewis & Reilly
Seattle—Baxter & Baxter
Sioux City—The Pelletier Co.
Spokane—The Crescent
Springfield, Mass.—Forbes & Wallace
Syracuse—121 West Jefferson St.
Tacoma—255 So. 11th St. (Fidelity Bldg.)
Toledo—LaSalle & Koch Co.
Toronto—7 Queen St. East (at Yonge)
Troy—35 Third St. (2nd floor)
Tulsa—Lyon's Shoe Store
Utica—28 & 30 Blandina St., cor. Union
Washington, D. C.—1319 F Street (2nd floor)
Wheeling—Geo. R. Taylor Co.
Wilmington, Del.—Kennard-Pyle Co.
Worcester—J. C. MacInnes Co.
Yonkers—32 Main St.
Youngstown—B. McManus Co.

*Agencies in 465 other cities*



*The Imperial*
*$1895 f. o. b. Detroit; tax extra*

# Different and Finer Results from Different, Finer Engineering

Out of a clear sky, the Chrysler Six has brought the motor car industry to the point invariably reached in any industry of economic importance.

That is the point where revolutionary improvements and advancements begin to render the original invention obsolete.

That never happens until the newest product proves its right to precedence, by reason of greatly simplified design, greater efficiency, and radically different operating results.

The Chrysler Six has established its own right to precedence, by proving these things—not only in the eyes of scientific and engineering men, but of the public as well.

Proven engineering fundamentals have been adhered to in the Chrysler Six; but they are applied in new and different ways that produce sensational results.

To the best of our knowledge, there never before has been a 3-inch engine capable of producing 68 horsepower and a speed of 70 miles an hour—with gasoline economy safely over 20 miles to the gallon.

That is what scientific gas distribution, special combustion chambers and heat distribution do.

There never before has been a car of 160 inches overall length, and a touring car road weight of 2705 pounds, that could be comfortably driven at 60 miles an hour and upward on cobbled street or rutted road.

That is what balance, low center of mass, and scientific distribution of weight do.

There has never before been a motor in which all sense of vibration has been so completely eliminated.

That is what uniform power impulses, balance of light reciprocating parts, seven big crankshaft bearings, and a heavy crankshaft do.

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That is what a spring mounting close to the hubs, and parallel to the wheels, low center of gravity and the perfect equalization of Chrysler-Lockheed hydraulic four-wheel brakes do for the Chrysler Six.

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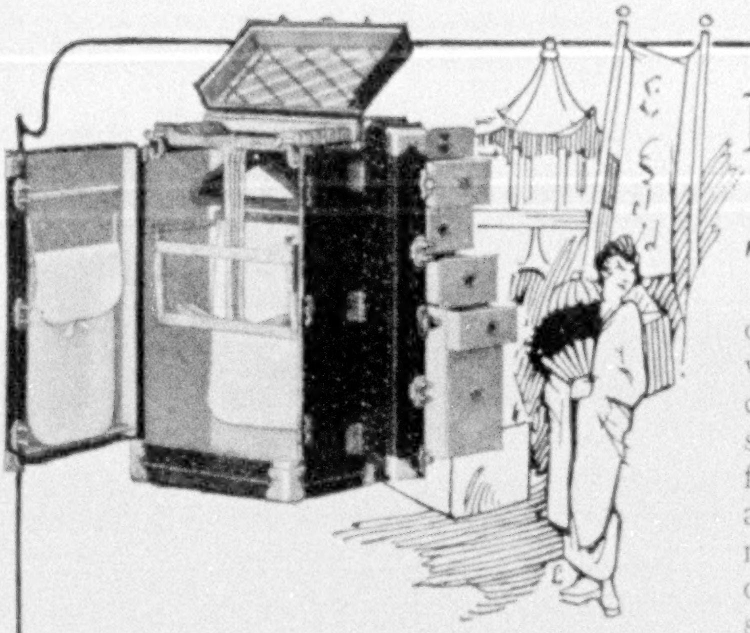
CHRYSLER MOTOR CORPORATION, DETROIT, MICHIGAN
Division of Maxwell Motor Corporation

# The Chrysler Six

*Pronounced as though spelled, Cry'sler*

XUM



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The Trunk with Doors

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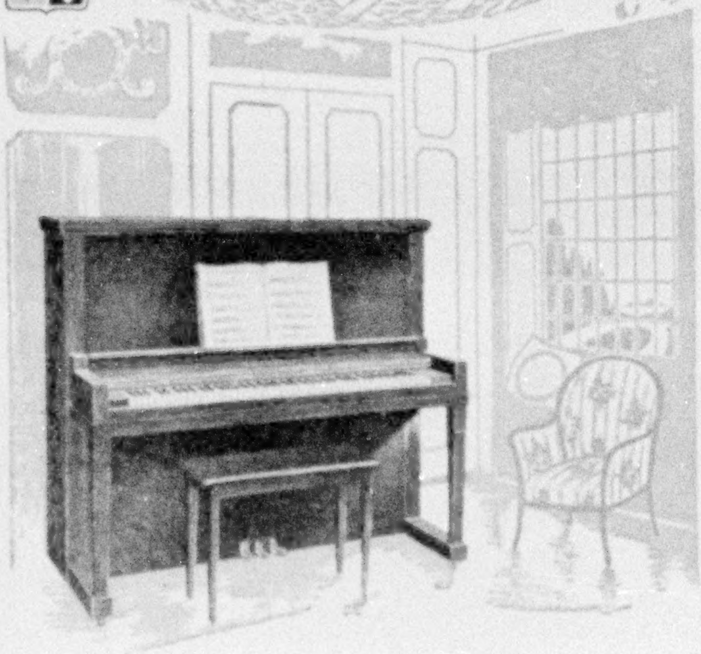

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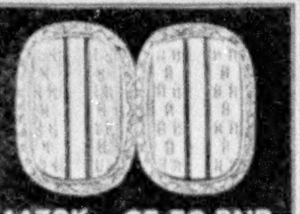

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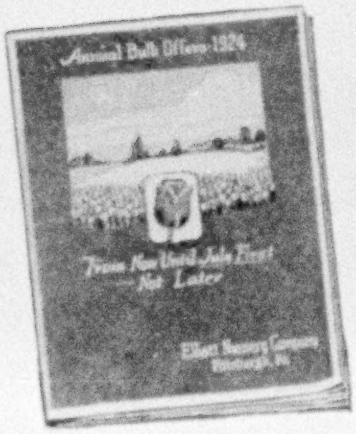
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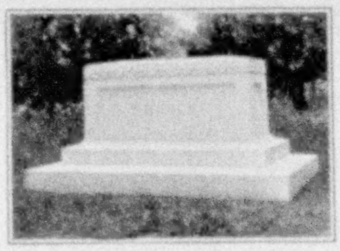

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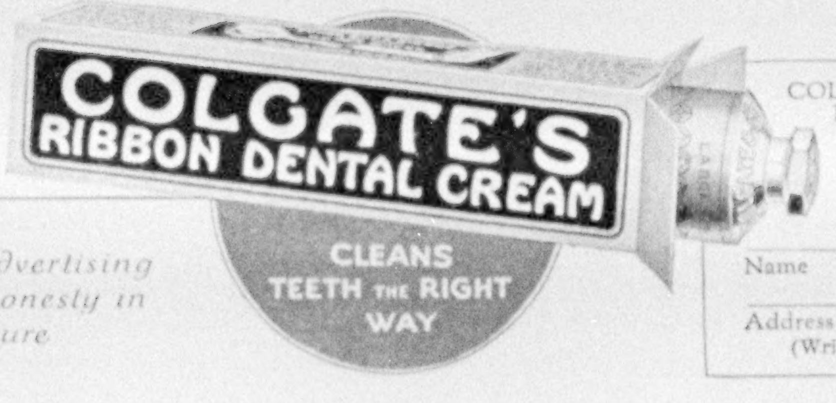

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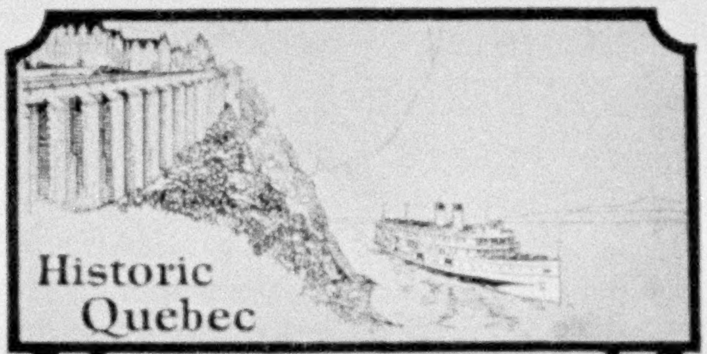

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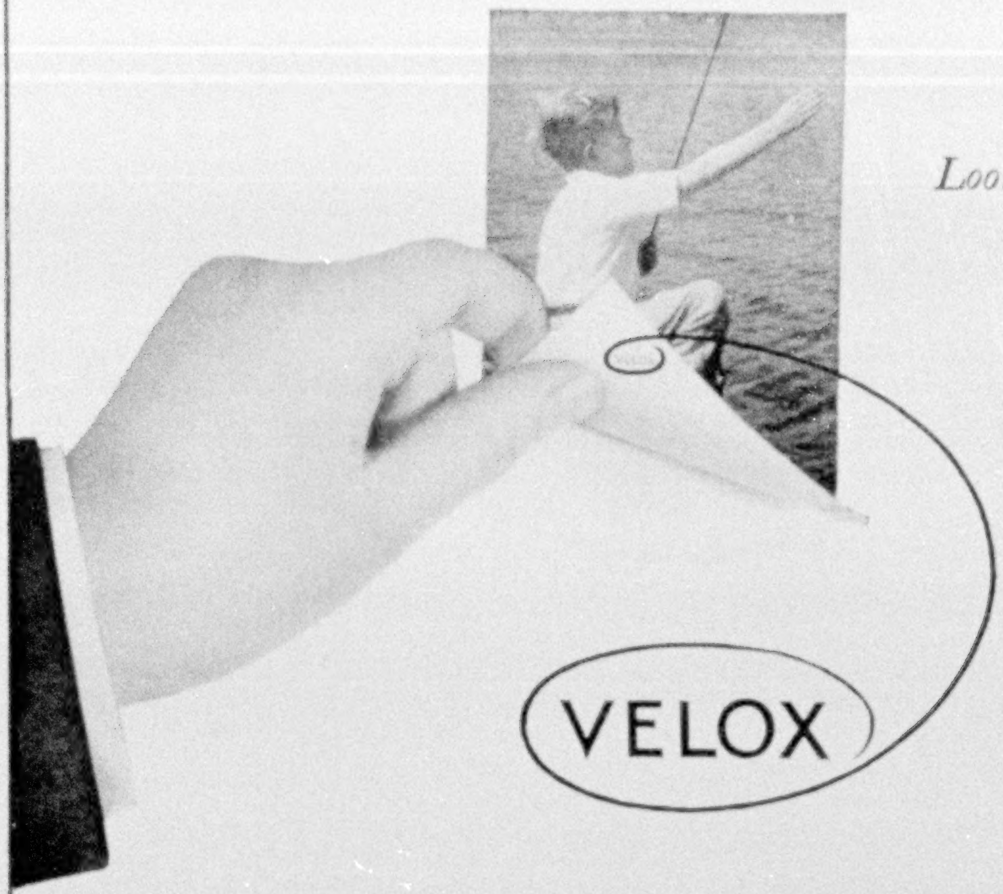

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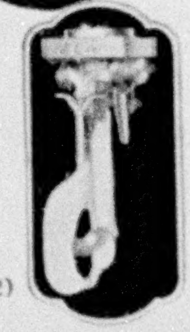

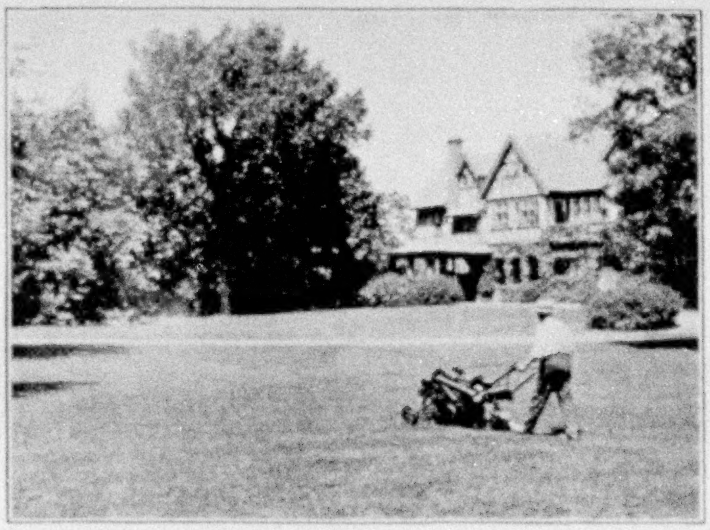

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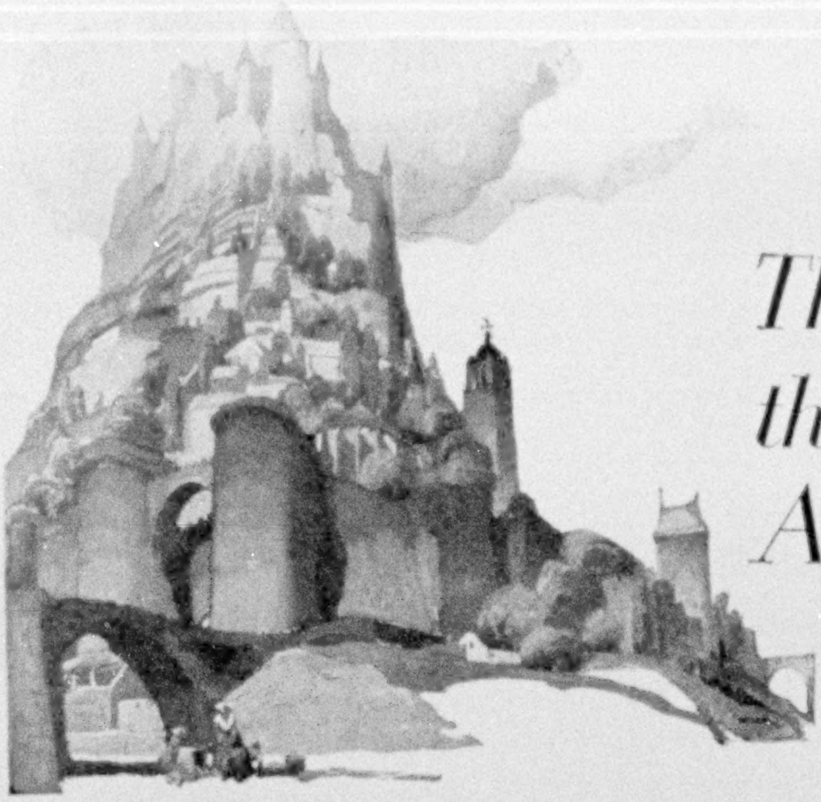

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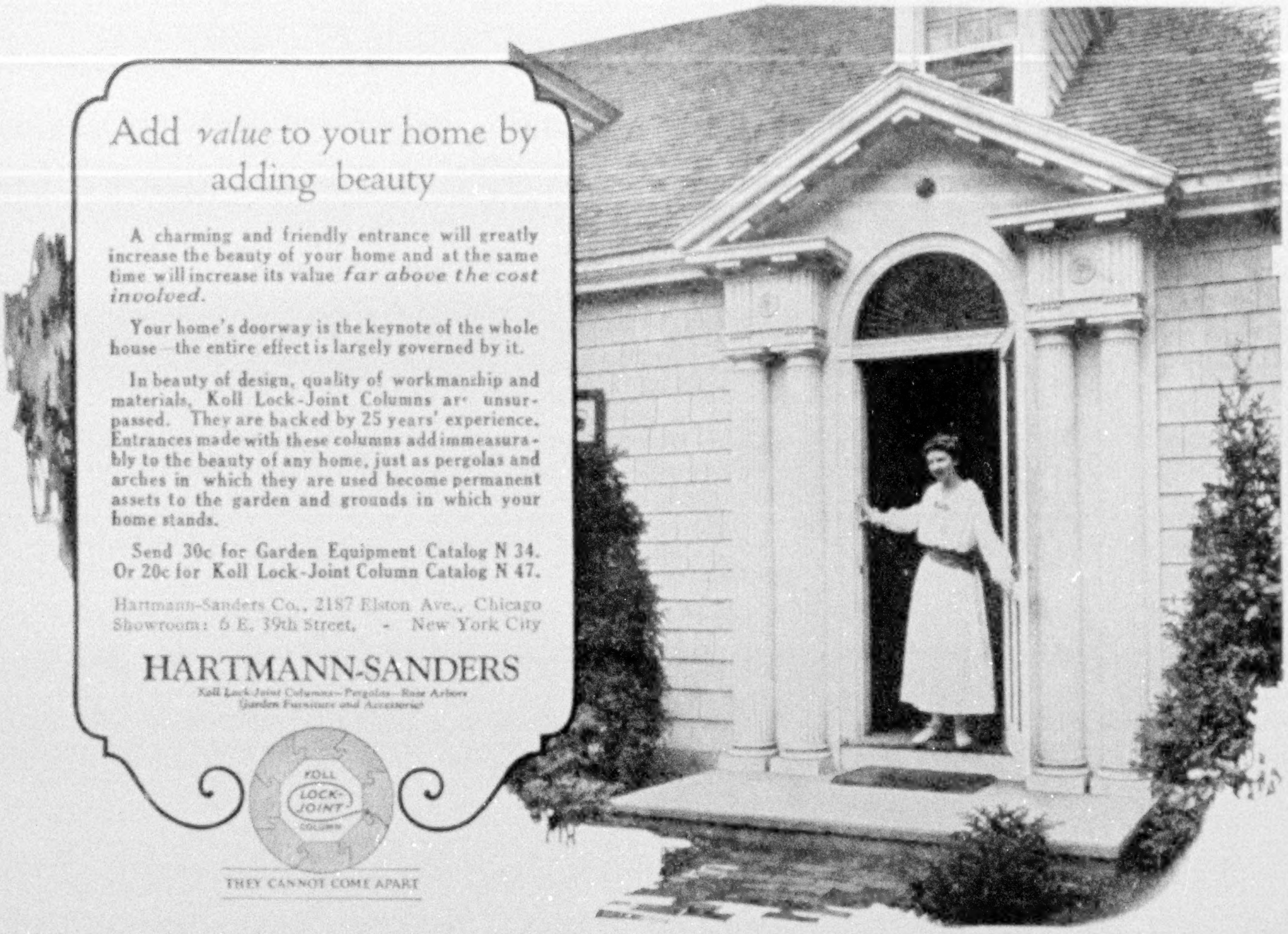

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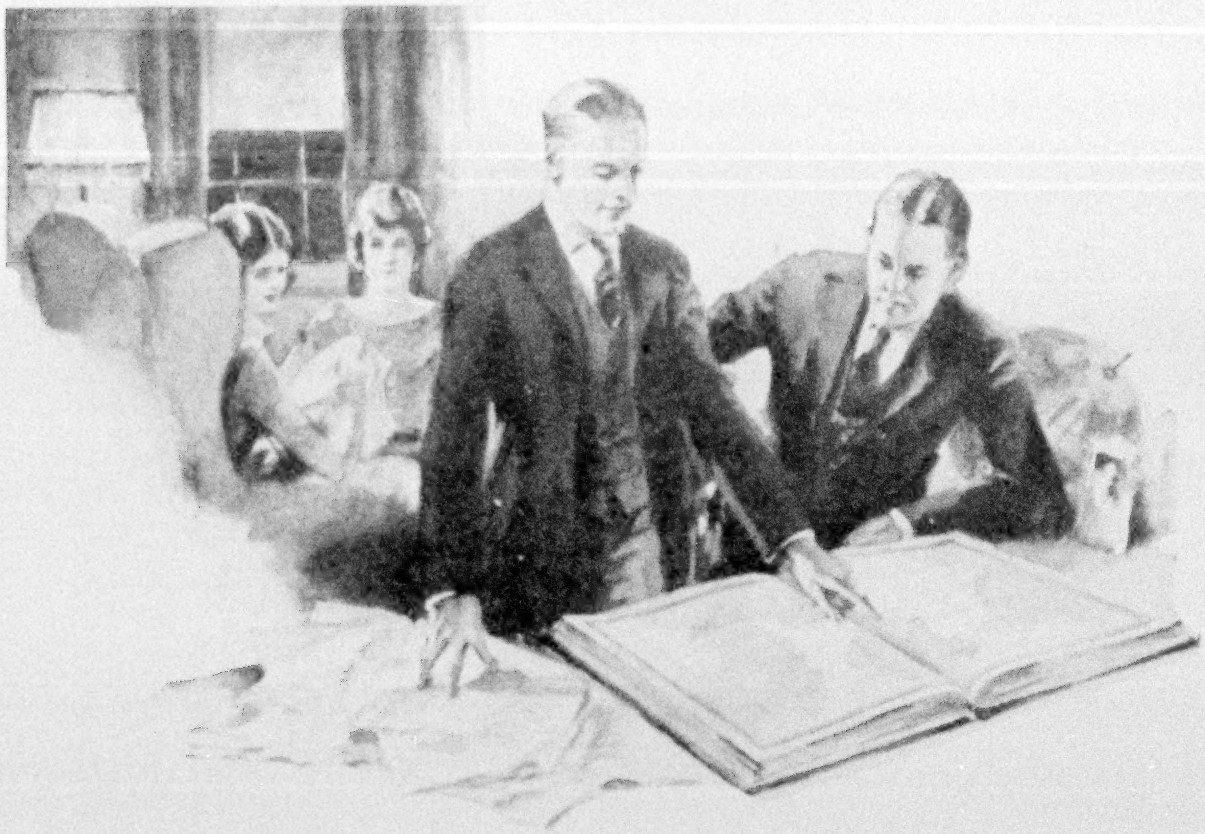
6-24



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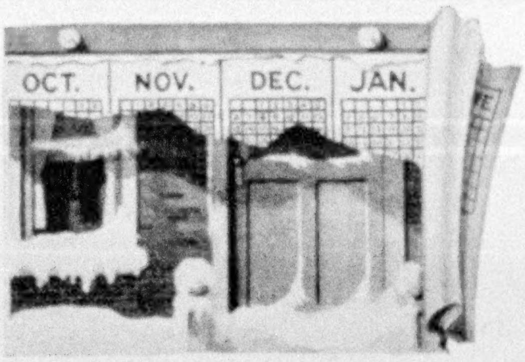

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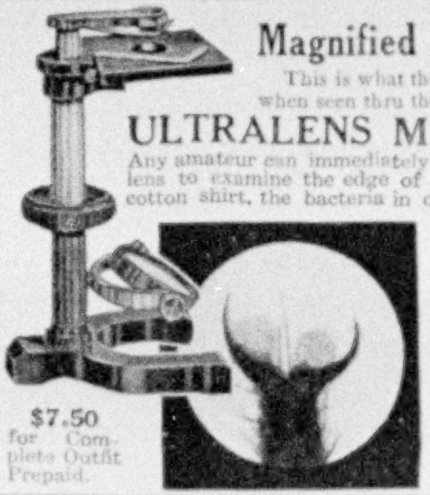

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Brighten up the walls with pictures and photographs without injuring wall paper or plaster. Picture hanging, whether framed or unframed, is fascinating when you use

Moore Push-Pins
*"Glass Heads—Steel Points"*

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**10c pkts.** Sold everywhere. In Canada, 15c.
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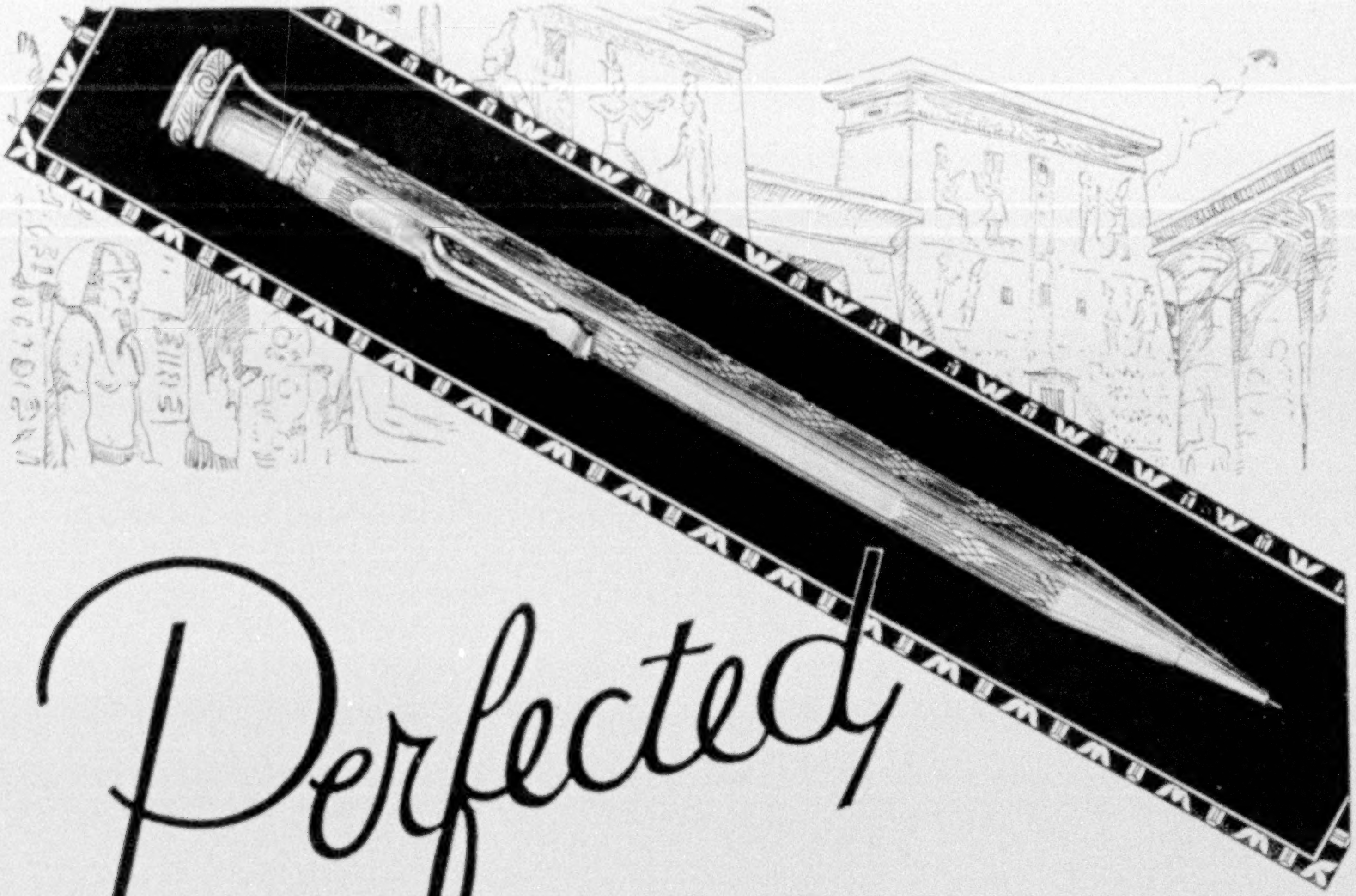

# Perfected

### Six New Features

1. Rifled tip now perfected. New tip construction makes clogging or jamming impossible. Still the lead is firmly held at the point.
2. Extra leads accessible immediately. New lead drawn from magazine with half turn of cap. You can always see how much lead in use and in reserve.
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4. Replaceable Eraser.
5. Stronger, Better Clip.
6. Every part replaceable.

### Unconditionally Guaranteed

The New Perfected Eversharp is guaranteed against faulty operation of any kind, from any cause whatever. All dealers are authorized to replace free of charge any part or parts that fail to operate to your entire satisfaction.

FOR a thousand years man has used but imperfect writing tools. And only *now* has the pencil been perfected.

Six new features raise the new Eversharp into a superior, the *supreme* writing companion.

When you put the New Eversharp to paper, there is the firm feeling of a positively gripped lead. A firm grip at the perfected rifled tip means every line is accurate at the impulse of your hand.

No more clogged tips. Beautiful, efficient, quick-loading. In every way a pencil to be proud of.

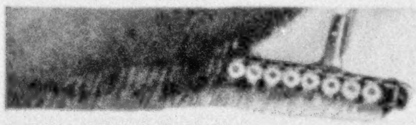
Dealers everywhere invite you to try the perfected Eversharp. Prices from $3. to $10. for gold-filled or sterling silver. But you can buy Eversharps from $1. to $50.

***Give one to the Graduate.***

Made in U. S. A. by THE WAHL COMPANY, CHICAGO
*Canadian Factory*, THE WAHL COMPANY, LTD., TORONTO
*Manufacturers of the Wahl Eversharp and the Wahl All-metal Fountain Pen*

## The NEW PERFECTED
## WAHL *EVERSHARP*

MONTAMOWER



*The ordinary lawnmower is heavy and hard to push. MontaMower is light, easy to operate, takes hard work out of cutting the grass.*

## The New Easy Way to Cut Lawns

**$18.00**
*Direct from factory*

MontaMower—a new and entirely different lawnmower—takes the hard work out of mowing lawns. Light—weighs only 7½ lbs.—handles as easily as a rake. Cuts lawn perfectly—leaves no wheel marks or ridges—trims close to walls, trees, etc. No hand trimming necessary.

### Simple—Durable—Entirely Different

MontaMower is the result of ten years' development—no gears—no long blades to get out of order or break—eight pairs of circular, toothed cutters driven by eight wheels shear the grass evenly. MontaMower is built overstrength—made from finest steel—cutters will last from two to four years without replacing or sharpening. Can be easily replaced at very small cost.

### Light—Handles as Easily as a Rake

Weighs only 7½ lbs.—can be operated by a woman or child without effort—easily carried to and from basement. Practically silent in operation. Thousands of satisfied owners all over the country.

### ORDER A MONTAMOWER TODAY

Send check or draft for $18.00 direct to factory. Guaranteed to be as represented or money refunded. Delivery charges prepaid if remittance accompanies order.

**MONTAGUE MFG. COMPANY**
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GRAND RAPIDS :: :: MICHIGAN
Export Department, 19-25 West 44th Street, New York City

—MAIL COUPON TODAY—

Send me one MontaMower by parcel post, prepaid. I enclose $18.00 in full payment.

*Name*______________________________

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We Pay the Freight

You can buy all the materials for a complete home direct from the manufacturer and save four profits on the lumber, millwork, hardware, labor.

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Living room, dining room, 2 bedrooms, kitchen, bath. 4 other plans, some with pantries, dining alcoves, grade and inside cellar entrances. Get free Aladdin Catalog.

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Price includes all lumber cut to fit; highest grade interior woodwork, siding, flooring, windows, doors, glass, paints, hardware, nails, lath, roofing, with complete instructions and drawings. Freight paid to your station. Permanent Homes—NOT PORTABLE. Many styles to choose from. Write nearest mill today for FREE Money-Saving Aladdin Catalog No. 365.

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Undoubtedly the one thing uppermost in a puppy's mind is food. Proper eating habits formed while your dog is young insure health and vitality throughout his life.

Dogs fed regularly on SPRATT'S Dog Cakes and Puppy Biscuits get just the proper nourishment. No other food is necessary.

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127 Full-Color Portraits
86 other engravings; 240 pages

On vacation rambles in field or woodland, know, name, and understand all the four-footed friends you glimpse. The outdoor book beloved of President Roosevelt.

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***Not if your gums bleed easily***
***Check Pyorrhea with Forhan's***

Pyorrhea, destroyer of teeth and health, plays no favorites. Dental records show that four persons out of every five past 40, and thousands younger, too, are Pyorrhea's victims.

Heed Nature's warning—tender, bleeding gums—before it is too late. Better still, stop Pyorrhea before it strikes by regular visits to your dentist and by brushing your teeth twice daily with Forhan's For the Gums.

Forhan's For the Gums, if used in time and used consistently, will help prevent Pyorrhea or check its course; keep the gums firm, the teeth white, the mouth healthy.

Ask for, and insist upon, Forhan's For the Gums. At all druggists, 35c and 60c in tubes.

**Forhan's**

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Formula of
R.J. Forhan DDS
Forhan Company
New York
Forhan's
TRADE MARK
FOR THE GUMS
"BRUSH YOUR TEETH WITH IT"
FORMULA OF
R.J. Forhan, D.D.S.
Specialist in DISEASES OF THE MOUTH
PREPARED FOR THE PRESCRIPTION OF THE
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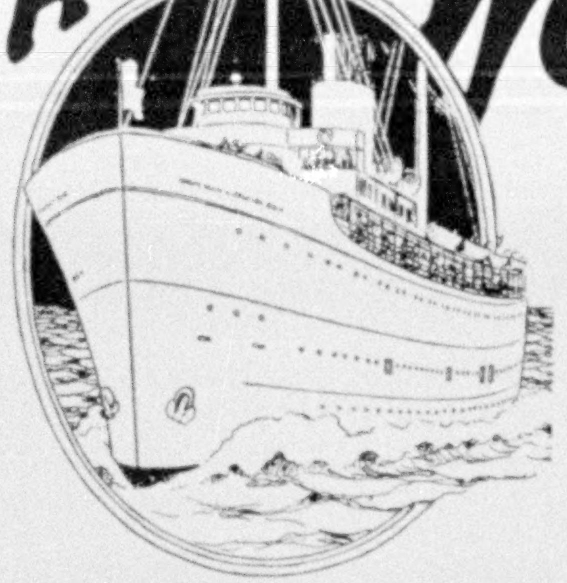

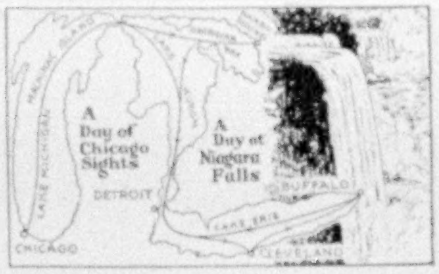

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*with a full day at Niagara Falls*

**$74.50**
*Meals and Berth Included*

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A trip of over 2,000 miles with alluring scenery enroute—new experiences and thrills. Plenty of time allowed at all points of interest to see the sights.

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in comfort and luxury are equal to the finest Atlantic Liners. Promenade and Sun Decks of unusual width; large Grand Salon and Lounge Rooms; Observation Roof Garden. All Staterooms and Parlor Rooms are outside rooms. Bath and toilet in connection with each Parlor Room and convenient to all Staterooms. Excellent meals daintily served by waitresses neatly dressed in white. For those who enjoy gaiety there are deck games, entertainments, music and dancing with a social hostess to look after the enjoyment of guests. Open air playground screened in with attendant for the children.

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WHOLE WHEAT GRAHAM CRACKERS

*Build Strength*
*Protect Health*
*Good for you*
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This is a greatly reduced photograph of the package of Wheatsworth Crackers sent you free. These crackers are recommended for flavor and wholesomeness by such authorities as Alfred W. McCann, Dr. Harvey W. Wiley, Luther Burbank.

WE want you to try Wheatsworth Whole Wheat Crackers at our expense, because we want to prove to you how wonderfully delicious and nourishing they really are. 100 per cent body and brain food in tempting cracker form—nut-sweet, crisp and fresh. Taste them for yourself. Enjoy them with tasty fillings of butter, peanut butter, cheese, jelly or jam; break them in a bowl of milk; or eat them plain—right from the box. The children, too, will love them. Right now, while you think of it, mail this coupon with 4 cents in stamps to cover postage, and the special free trial package will be sent by return mail.

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I enclose 4 cents in stamps to pay for postage on Free Sample Package of Wheatsworth Whole Wheat Crackers, to be sent me promptly at address here given.

Name........................................

Address........................................

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## Horses of the World

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**24 full-page illustrations in color—masterpieces of equine portraiture—by Edward Herbert Miner. 60 engravings; 110 pages.**

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*Royal octavo, Buckram, $3. Postpaid in U. S. Foreign mailing 25 cents*

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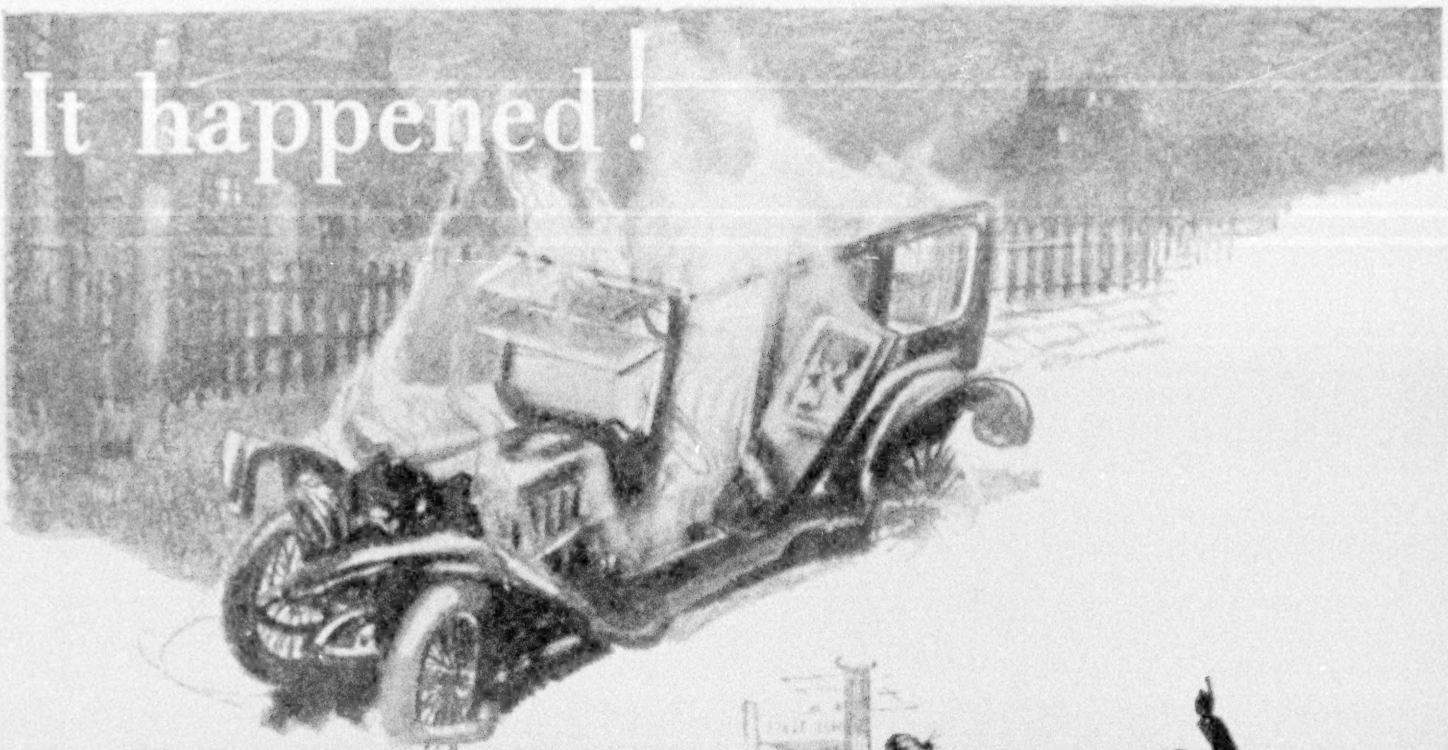

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With a Pyrene you can put out any fire at the start and prevent serious injury to yourself, your loved ones and your property.

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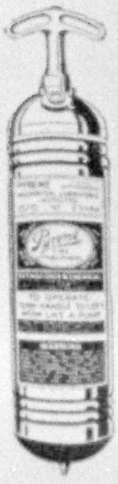

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**G Washington's Delicious Instant Coffee *is made***

**Just add water—dissolve and drink**

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*Togan Summer Cottages*

The development of many years of summer cottage building. Quality comparable to Grand Rapids Furniture. Standardized factory construction makes erection an easy matter, and volume production makes possible the low price. A wide choice,—from very inexpensive to more elaborate models.
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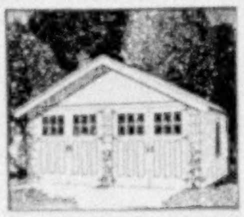

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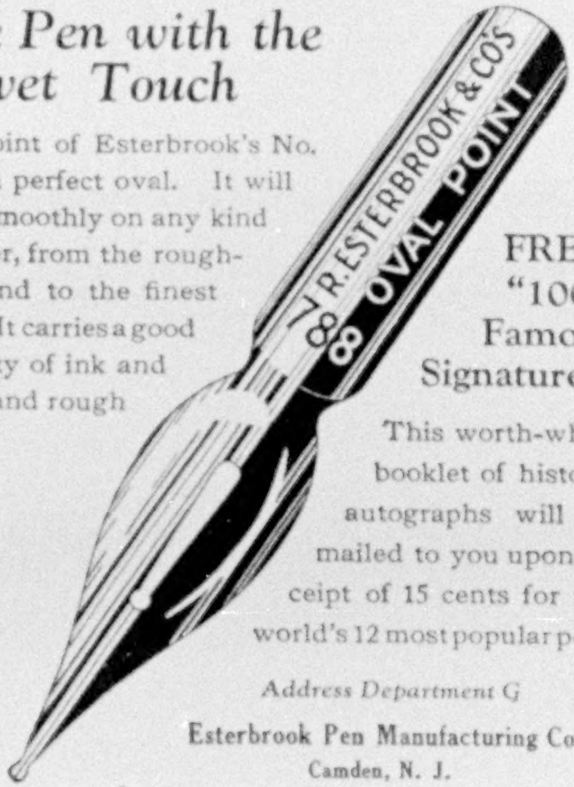
The point of Esterbrook's No. 788 is a perfect oval. It will write smoothly on any kind of paper, from the roughest bond to the finest linen. It carries a good quantity of ink and will stand rough use.



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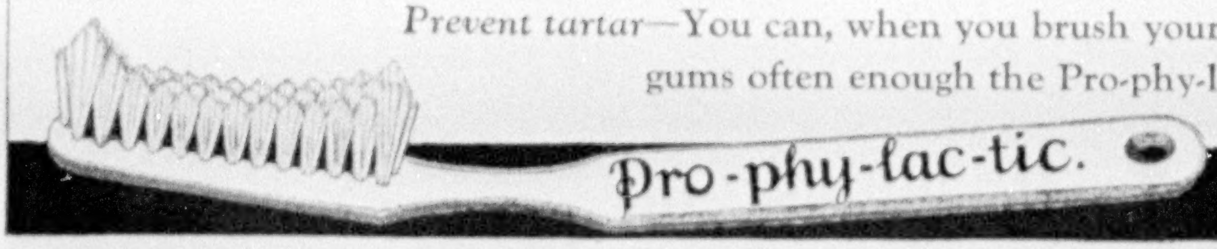
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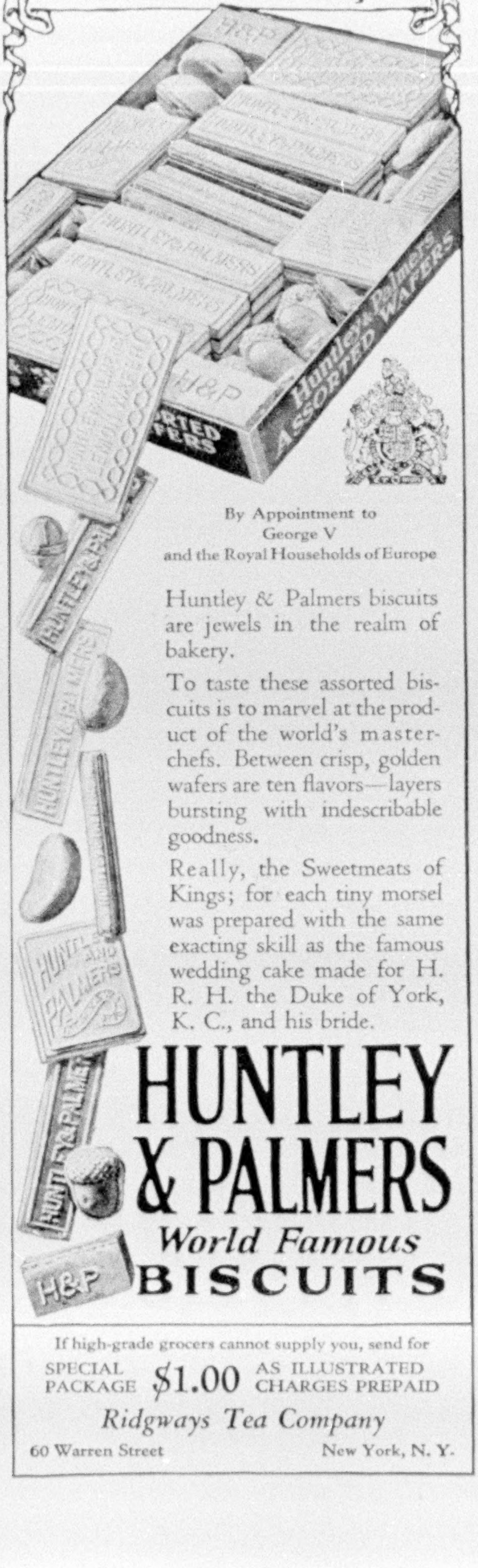
*Delicious Assorted Wafers*



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George V
and the Royal Households of Europe

Huntley & Palmers biscuits are jewels in the realm of bakery.

To taste these assorted biscuits is to marvel at the product of the world's master-chefs. Between crisp, golden wafers are ten flavors—layers bursting with indescribable goodness.

Really, the Sweetmeats of Kings; for each tiny morsel was prepared with the same exacting skill as the famous wedding cake made for H. R. H. the Duke of York, K. C., and his bride.

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*World Famous*
**BISCUITS**

If high-grade grocers cannot supply you, send for
SPECIAL PACKAGE $1.00 AS ILLUSTRATED CHARGES PREPAID
*Ridgways Tea Company*
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*Make Your Little Girl Happy with an*

**Add-a-pearl** NECKLACE
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A splendid gift for a little girl's birthday, or any occasion. Start with a small strand, which is added to on all gift occasions each year—until she has a necklace of genuine pearls. Your jeweler will supply you.

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Buy additional pearls for your Add-a-pearl necklace on this card. It guarantees perfection.

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The Add-a-pearl Co., Chicago

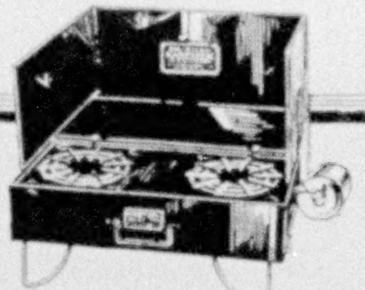
The Morning After a Night in a Tent, *Kampkook* Proves a Real Pal

With its simple, everready convenience, you can turn out breakfast in jig time. No fuel to gather; it burns motor gasoline. Its clear blue flame is as fast and clean as that of your kitchen range. A folding adjustable windshield makes it independent of weather. When you're ready to travel, *Kampkook* folds like a suitcase with everything inside.

Plan to take kitchen convenience with you on your vacation—get your Kampkook now. Catalog on request.

*$7.50 to $15.00 in U. S. Sporting goods dealers everywhere.*

AMERICAN GAS MACHINE CO., Inc.
834 Clark Street, Albert Lea, Minn.



AMERICAN
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USED BY MORE THAN A HALF MILLION CAMPERS

*Does one thing well*

Sani-Flush cleans the toilet bowl—better than any other means. It removes all stains. Sanitizes the unhealthful trap. Destroys all foul odors. No injury to plumbing connections.

No scrubbing. Simply sprinkle Sani-Flush into the bowl—follow directions on the can—flush. Keep a can always handy.

*Buy Sani-Flush at your grocery, drug or hardware store, or send 25c for a full-size can.*

THE HYGIENIC PRODUCTS CO.
Canton, Ohio

Sani-Flush
Reg. U.S. Pat. Off.
Cleans Closet Bowls Without Scouring

Merton-Air
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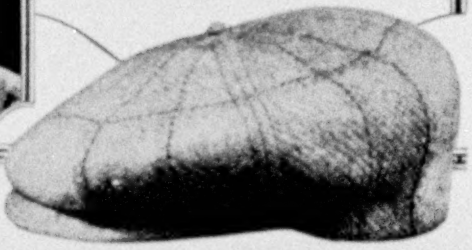
The AIR COOLED CAP

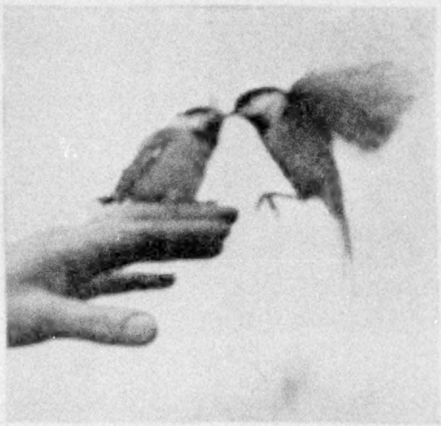
ventilating screen lets the air in.

*Helps Your Game!*

A favorite cap with golfers. The ventilator lets the fresh air circulate inside the cap and keeps the head cool. Helps you to play better and to better enjoy your game. Names of dealers nearest you upon request. Address us at 210 Fifth Ave., N. Y.



THE BOOK OF BIRDS



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Bird Portraits
in Full Colors

200 Pages
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Charming Text

Enrich Your Summer Outing
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Know the birds and understand their ways. This book by Henry W. Henshaw takes you into their homes and haunts. The color portraits by Louis Agassiz Fuertes enable even a child to identify these feathered neighbors. (*Circular on request*)

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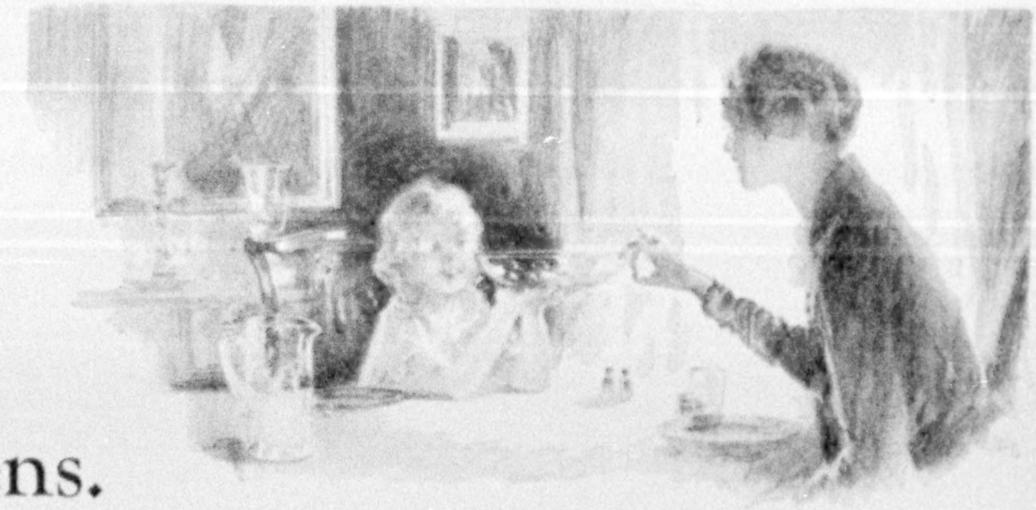


# "Look, it glistens.

## Hold it, it's heavy. Tap it, it rings."

In the light the bowl glistens with the rainbow's colors. In your hand it is heavier than the common glass bowl. When you strike it, you hear a clear, bell-like ring.

Lead, that dull, unattractive metal, is responsible for the brilliance of fine glass. Because the lead used in making the glass gives it the density necessary to bend or reflect light rays, the glass has the lustre and color that cheaper glass does not have.

Lead also gives weight to glass. The piece of fine plain glass or cut-glass you pick up may be anywhere from 20% to 50% lead. Table glass, such as tumblers and goblets, is from 20% to 40% lead.

One glass manufacturer in a year used 200,000 pounds of lead. The entire glass industry takes about 14,000,000 pounds of the annual lead production in the United States.

The astronomer, the chemist, and the biologist invoke the aid of the lead glass lens in microscope and telescope.

In the millions of buildings that are lighted by electricity, lead in electric light bulbs is helping to make night as much like day as possible.

Lead in glass is very bashful and conceals itself so that there is no visible sign of its presence. But in its more general use as paint, you can see it on every hand. As white-lead, mixed with pure linseed oil, it protects such surfaces as wood from rot and decay. As red-lead it prevents rust from destroying iron and steel.

"Save the surface and you save all"

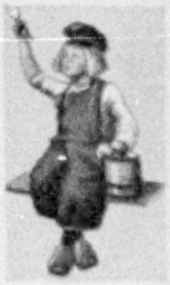
*Producers of lead products*

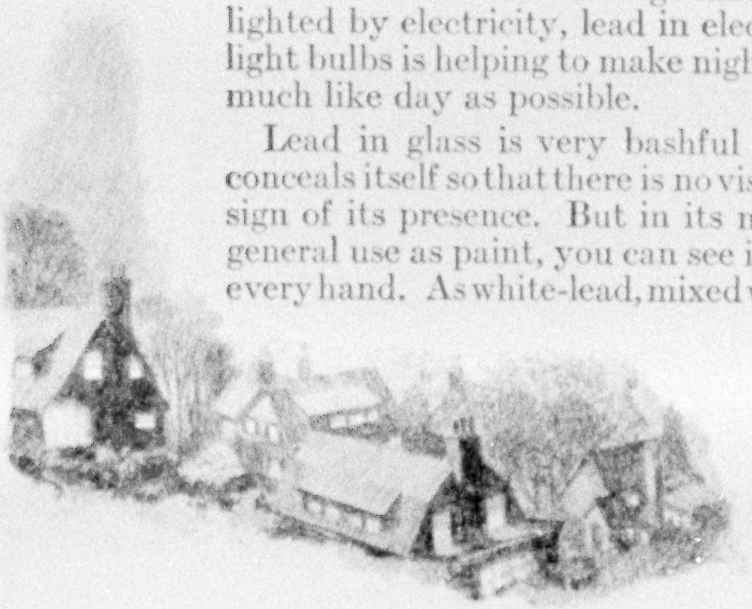
*Dutch Boy white-lead* is the name of the pure white-lead made and sold by National Lead Company. On every keg of Dutch Boy white-lead is reproduced the picture of the Dutch Boy Painter shown below. This trade-mark guarantees a product of the highest quality.

Dutch Boy products also include red-lead, linseed oil, flatting oil, babbitt metals, and solder.

National Lead Company also makes lead products for practically every purpose to which lead can be put in art, industry and daily life. If you want information regarding any particular use of lead, write to us.

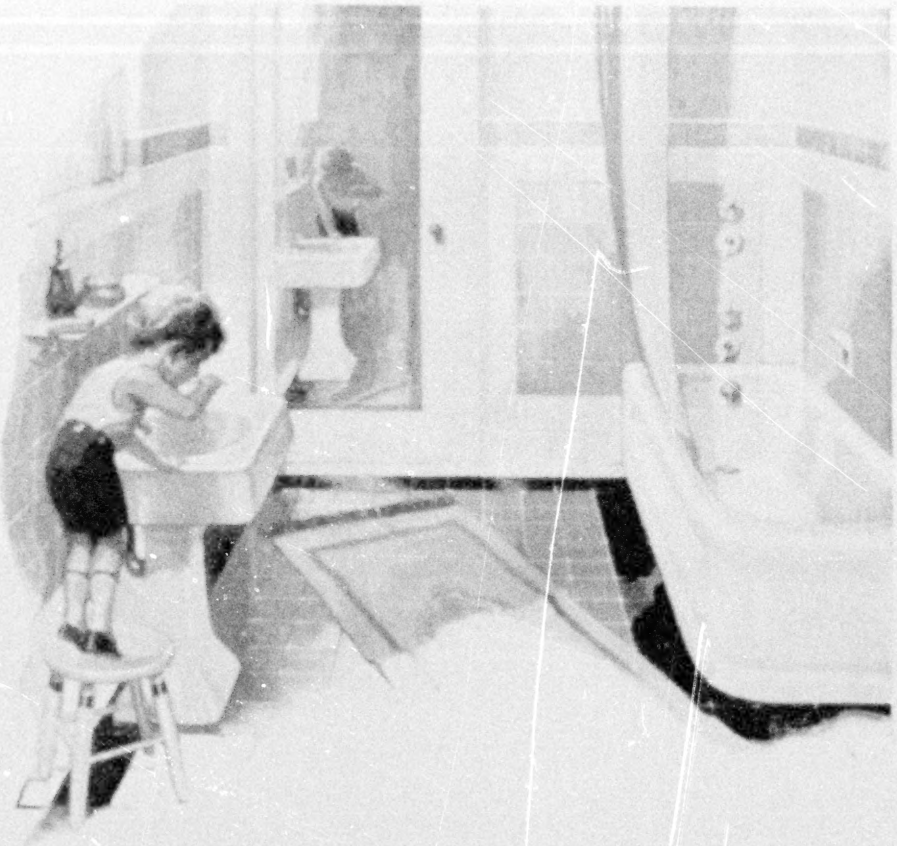
If you wish to read further about this wonder metal, we can tell you of a number of books on the subject. The latest and probably the most complete story of lead and its many uses is "Lead, the Precious Metal," published by the Century Co., New York. Price $3. If you are unable to get it at your bookstore, write the publishers or order through us.





NATIONAL LEAD COMPANY

New York, 111 Broadway; Boston, 131 State St.; Buffalo, 116 Oak St.; Chicago, 900 West 18th St.; Cincinnati, 659 Freeman Ave.; Cleveland, 820 West Superior Ave.; St. Louis, 722 Chestnut St.; San Francisco, 485 California St.; Pittsburgh, National Lead & Oil Co. of Pa., 316 Fourth Ave.; Philadelphia, John T. Lewis & Bros. Co., 437 Chestnut St.



Re-modernize your bathroom

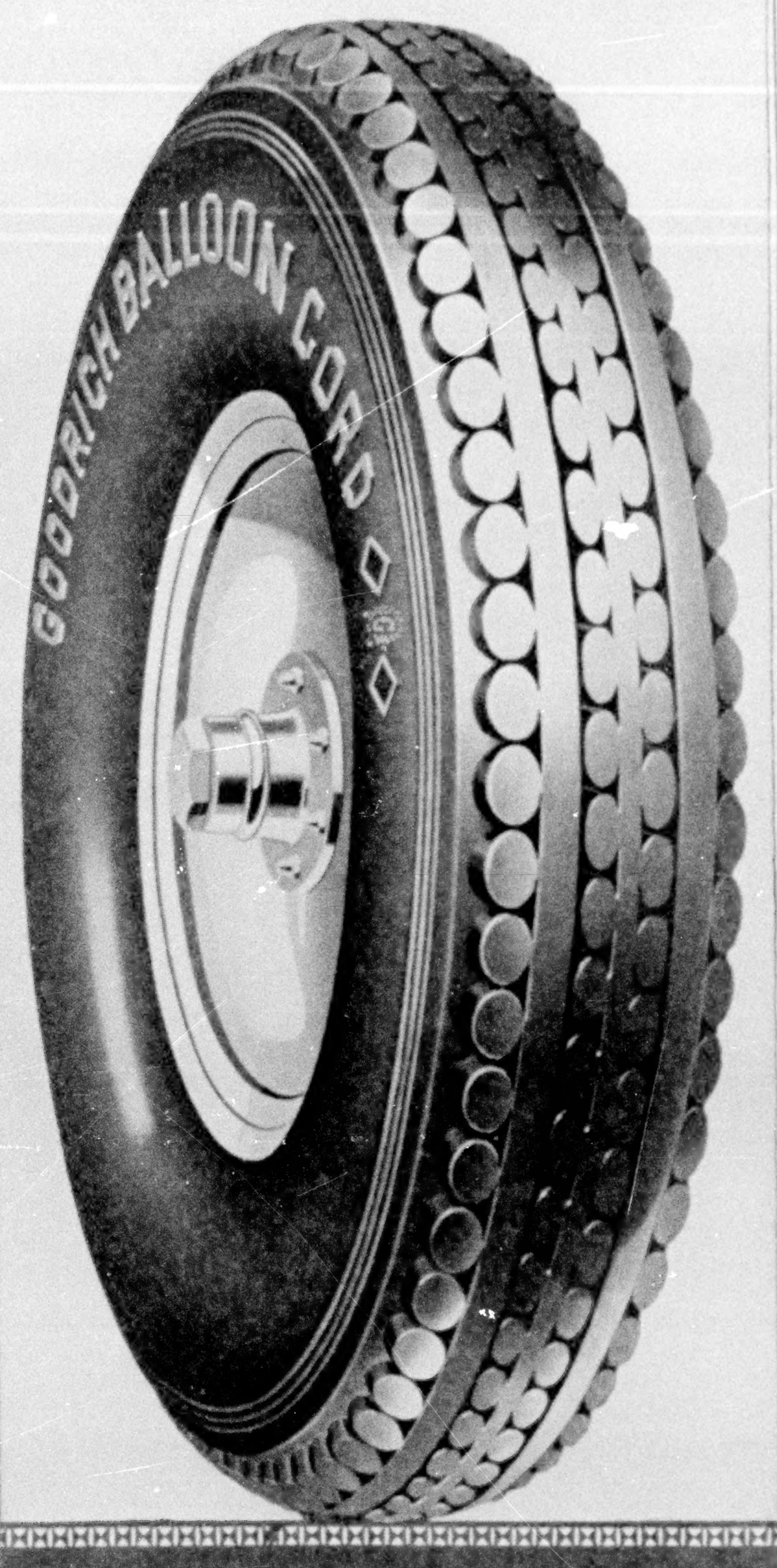
The changes which make modern plumbing fixtures seem so far ahead of what was the last word only a few years ago have not been superficial ones, dictated by whims of fashion. Instead they clearly mark the forward march of the science of sanitation . . . . What woman, for example, does not recognize the hygienic and labor-saving advantages of the Kohler built-in bath, which seals up the hard-to-clean places behind and beneath?

There are many sound reasons—of cleanliness, convenience, and pride—for re-modernizing a bathroom that is not quite up-to-date. There are sound reasons, too, for choosing Kohler Enameled Plumbing Ware. Your plumbing dealer will tell you that it is not expensive, and that the name "Kohler," unobtrusively fused into the durable, snow-white enamel of every Kohler fixture, is the sign of unique and surpassing quality . . . . May we send you the Kohler booklet?

KOHLER OF KOHLER

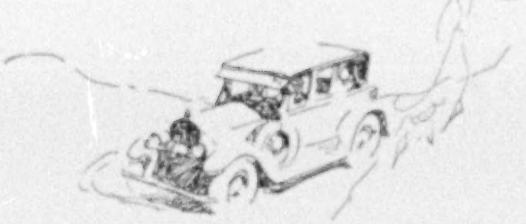
Kohler Co., *Founded 1873,* Kohler, Wis. · *Shipping Point,* Sheboygan, Wis.
BRANCHES IN PRINCIPAL CITIES

MANUFACTURERS OF ENAMELED PLUMBING WARE AND KOHLER AUTOMATIC POWER AND LIGHT 110 VOLT D. C.



**GOODRICH**
**Balloon**
**Cord**

Balloon Cords
mean *Extra*
cushioning



BALLOON is an apt name for broad-gauge, low-air pressure tires because it implies the cushioning use of the air.

Air is nature's best cushion, and the lower the pressure, the better the cushion.

With their low-air pressure, Goodrich Balloon Cords give the motorist the betterment—the new ease and pleasure—he is always seeking.

It is a special, de luxe service in tires.

Just as riding in a parlor car is more comfortable than riding in a day coach, so riding on Balloon Cords is more comfortable than riding on high-air pressure tires.

Once Goodrich Balloon Cords are on a car, driver and passengers know a positive improvement. It is seen and felt in driving, maintaining, and enjoying the car. . . . . Call on a Goodrich Dealer, and ask him to tell you the latest facts and suggestions on Goodrich Balloon Cords.

THE B. F. GOODRICH RUBBER CO.
*Akron, Ohio*

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*The Goodrich "55" tire is made full size to meet the wishes of the discriminating owner of a light car*

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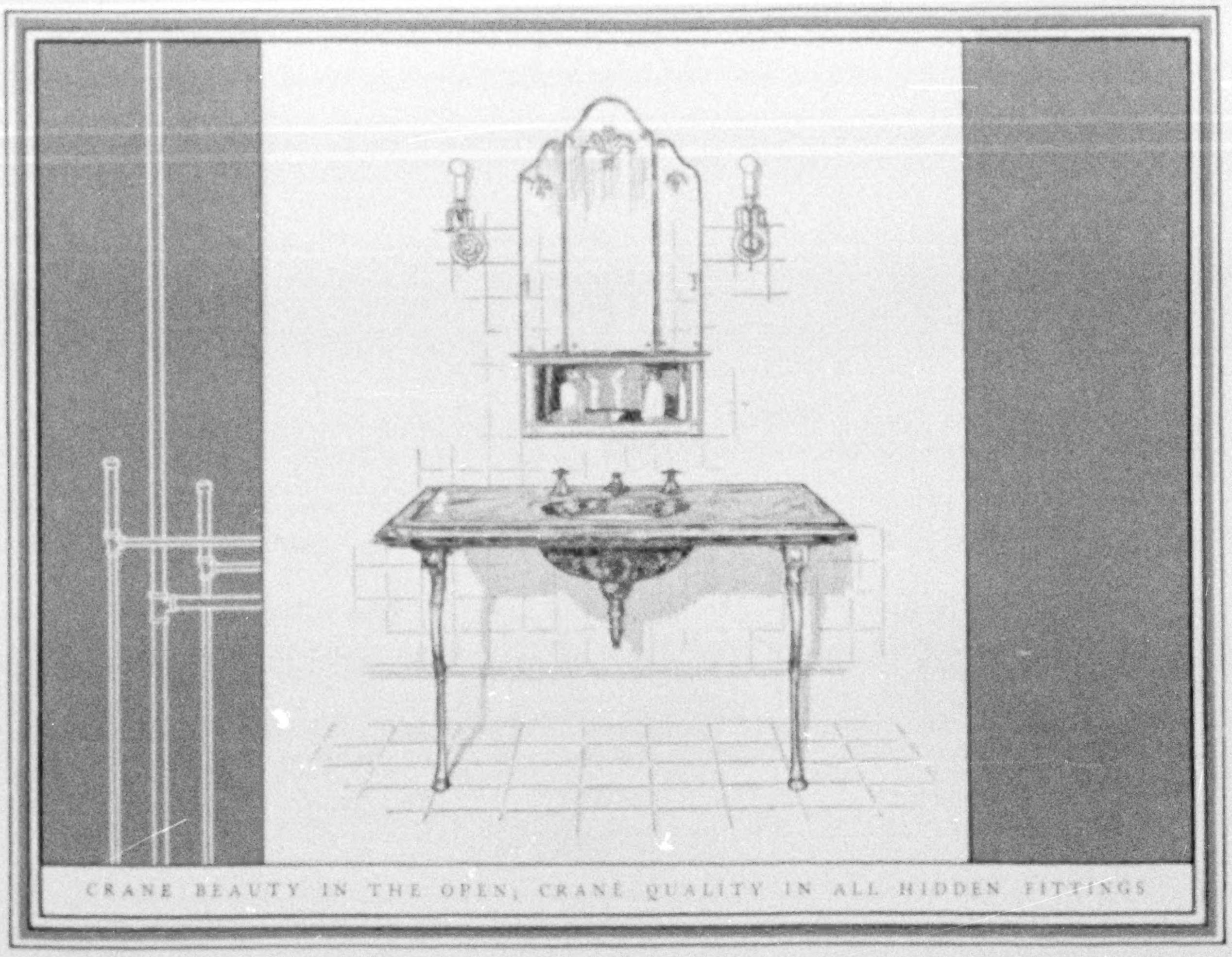

CRANE BEAUTY IN THE OPEN; CRANE QUALITY IN ALL HIDDEN FITTINGS

In the modern home, the greatest change wrought in recent years has been, perhaps, the addition of color and positive beauty in bathroom appointments. In the *Neumar* lavatory, shown above, the broad top of black Italian marble, gold-veined, is supported by bronze legs, finished like all other metal parts, in a heavy gold plate. The swinging panels of the Crane triple mirror hide cabinets for toilet articles. The *Neumar* is one interesting example in a very wide range of Crane plumbing and heating materials sold only by contractors, at prices within the reach of all. Let us send you "The New Art of Fine Bathrooms."

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